REPORT RESUMES

ED 002 989 24
A STUDY OF THE SIZE-COST-ACHIEVEMENT RELATIONSHIPS IN THE REORGANIZED SCHOOL DISTRICTS OF WISCONSIN.
BY- BRAGG, DESMOND H.
WISCONSIN UNIV., MADISON
REPORT NUMBER CRP-375-SUPPL. PUB DATE 60
EDRS PRICE MF-$0.27 HC-$6.96 174P.

DESCRIPTORS- *ORGANIZATIONAL CHANGE, *SCHOOL DISTRICTS, *COSTS, PROGRAM COSTS, STUDENT COSTS, EDUCATIONAL FINANCE, *STUDENT ENROLLMENT, *ACHIEVEMENT, MADISON, WISCONSIN

THIS REPORT IS A DISSERTATION ON AN INVESTIGATION INTO THE NATURE OF THE RELATIONSHIPS OF THE SIZE-COST-ACHIEVEMENT FACTORS OF 39 REORGANIZED SCHOOL DISTRICTS OF WISCONSIN. THE AIM WAS TO IDENTIFY THE SIZE DISTRICT AND LEVEL OF EXPENDITURE WHICH PRODUCE THE GREATEST EDUCATIONAL RESULTS AND TO EVALUATE THE REORGANIZED DISTRICTS BY DETERMINING IF THEY ARE EFFECTIVELY USING THE SIZE FACTORS TO PRODUCE GREATER ACHIEVEMENT. THREE SIZE CATEGORIES BASED ON TOTAL ENROLLMENT--(1) OVER 800, (2) 400 TO 800, (3) LESS THAN 400--WERE USED AS SUBJECTS. COST DATA FROM ANNUAL REPORTS OF DISTRICTS, MEASURES OF ACHIEVEMENT FROM TEST RESULTS, AND STUDENT QUESTIONNAIRES WERE ANALYZED FOR THIS STUDY. THE CONCLUSIONS DRAWN WERE THAT THERE WAS AN INVERSE RELATIONSHIP BETWEEN THE PER PUPIL COSTS AND THE SIZE OF THE SCHOOL. THUS, SMALLER SCHOOLS WOULD BENEFIT BY CONSOLIDATION AND OFFER A BETTER EDUCATIONAL PROGRAM AT A SAVING PER PUPIL. NO SIGNIFICANT DIFFERENCES IN ACHIEVEMENTS OF READING AND MATHEMATICS APPEARED IN SIZE CATEGORIES. BECAUSE OF THE INCONSISTENCY OF THE COST-ACHIEVEMENT RELATIONSHIP FURTHER STUDY IS RECOMMENDED. (GC)

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

A STUDY OF THE SIZE-COST-ACHIEVEMENT RELATIONSHIPS IN THE REORGANIZED SCHOOL DISTRICTS OF WISCONSIN

ED002989

BY

DESMOND HALCOMB BRAGG

A dissertation submitted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

Education (Administration)

at the

UNIVERSITY OF WISCONSIN

1960

Approved by

July 28, 1960

ACKNOWLEDGMENTS

The writer wishes to thank all those who have so generously given of their time in making this dissertation a reality. Prof. Kreitlow has been most helpful in every way throughout the past two years. To him the writer owes far more than words can say. Prof. Gregg has been most helpful in giving suggestions for improvement at every point in the writer's doctoral program. Prof. Barr has been a constant source of inspiration and encouragement and has also given valuable assistance in the statistical work of the dissertation. Prof. Eye's valuable criticisms helped clarify the style of the writing and many of the statements.

To my fellow classmate Reemt Baumann I owe a special word of thanks for his generous and patient help in the statistical problems encountered in the dissertation. Robert Barnes also gave generously of his time in straightening out some of the statistical problems. To both of these colleagues - a hearty thank you.

The workers in the Numerical Analysis Laboratory have been most helpful in acquainting the writer with some of the machines and their use. Mrs. Georgia Armour was most helpful and kind.

To Mrs. Naomi Stone who kept the coffee pot on and gave the office a pleasant and cheerful atmosphere in addition to her help on the thesis goes a warm and sincere thank you.

To my wife, Jean, and children I can only say they have made it all worth-while. Their loyal and patient efforts are greatly appreciated and will not be forgotten.

TABLE OF CONTENTS

Page

LIST OF TABLES . . . .

CHAPTER

I. INTRODUCTION. 1

Statement of the problem. 2

Legal and historical high lights. 4

Aims and purposes of reorganization 13

Significance of the study. 17

II BACKGROUND OF THE ISSUES AND REVIEW OF THE LITERATURE. 19

The rationale of school district reorganization . . 19

Clarification of the issues 21

Review of literature related to reorganization. . . 27

Review of the size-achievement literature 28

Review of the size-cost literature. 35

Review of the cost-achievement literature 38

III SOURCES OF THE DATA AND DESIGN OF THE STUDY 49

Source of the data. 50

The schools used in the study 50

The size data 51

The student data. 51

The cost data 51

The achievement data. 52

Source of intelligence data 53

Assumptions 55

Design of the study. 56

Two basic questions. 56

The three null hypotheses. 57

Summary of the data. 58

Statistical measures to be used. 64

IV ANALYSIS OF THE RELATIONSHIPS. 67

Question No. 1 68

Question No. 2 69

Summary of the relationships 78

V ANALYSIS OF THE DIFFERENCES IN THE SIZE-COST AND ACHIEVEMENT FACTORS. 84

Hypothesis 1 88

Hypothesis 2 90

Hypothesis 3 95

Summary of the differences 100

VI CONCLUSIONS AND RECOMMENDATIONS. 104

The size factor. 105

The cost factor. 106

The achievement factor 109

SUMMARY. 114

BIBLIOGRAPHY 116

APPENDICES 122

LIST OF TABLES

Table		Page
I	Basic Data for the Size, Cost, Achievement Relationships in the Reorganized School Districts of Wisconsin	23
II	Total Number of Students in Freshman Class, Number Used in the Study and Number of Farm Students in Each District and Per Cent Each is of Total in the Thirty-Nine Districts	70
III	A Comparison of Size and Cost Factors in Large, Medium and Small Reorganized Districts of Wisconsin	72
IV	Summary Table of Size, Cost, Intelligence, and Achievement Factors for High, Medium and Low Achieving Schools.	75
V	Analysis of Variance for Achievement Among Large, Medium and Small Schools.	89
VI	Mean Achievement and Henmon-Nelson Intelligence Scores in Large, Medium and Small Schools.	90
VII	Mean Intelligence and Achievement Scores for all Students and for Farm Students in Large, Medium and Small Reorganized Districts.	91
VIII	Analysis of Residuals.	94
IX	Division of Reorganized Districts into High, Medium and Low Cost Schools.	96
X	Summary Data on Size-Cost-Achievement and Intelligence Factors Among all Farm Students in High, Medium and Low Cost Reorganized Districts. . .	98
XI	Analysis of Residuals for the Analysis of Co-Variance Between Achievement and Intelligence for Farm Students from High, Medium and Low Cost Schools. . .	99
XII	Per Cent of Time Spent by Farm Students in Three Types of Elementary Schools in the Reorganized Districts of Wisconsin, 1950-59, and for all Farm Students by High, Medium and Low Cost Schools. . . .	100
XIII	Comparison of Achievement and Costs in High and Low Cost Schools with Seventy-Eight Per Cent of More Permanent Students in the Freshman Class	103

LIST OF FIGURES

Figure **Page**

1 Phases of Educational Quality Related to Expenditure Per Pupil. (From Lorne H. Woollatt, "The Cost-Quality Relationships on the Growing Edge". 43

2 Distribution of 1958-59 Total Net Enrollment in Thirty-Nine Reorganized Districts of Wisconsin. . . . 59

3 Distribution of Five-Year Average Net Enrollment in Elementary Schools of Thirty-Nine Reorganized Districts of Wisconsin. 60

4 Distribution of Mean Achievement Scores in Reading and Mathematics for Thirty-Nine Reorganized Districts of Wisconsin. 61

5 Distribution of Per Pupil Costs for Thirty-Nine Reorganized Districts of Wisconsin. 62

6 Distribution of Mean Henmon-Nelson Raw Scores for Thirty-Nine Reorganized Districts of Wisconsin. . . . 63

7 Correlation of Size and Achievement for Large, Medium and Small Reorganized Districts. 80

8 Correlation of Cost and Size for Three Size Groups - Large, Medium and Small in the Reorganized Districts of Wisconsin. 81

9 Correlation of Cost and Achievement for Large, Medium and Small Reorganized Districts 82

10 Correlation of Mean Achievement Scores and Henmon-Nelson Scores in Large, Medium and Small Reorganized Districts 83

11 Distribution of Individual Henmon-Nelson Raw Scores for Thirty-Nine Reorganized Districts 85

12 Distribution of Individual Achievement Scores for Thirty-Nine Schools 86

13 Distribution of Individual Achievement Scores for Large, Medium and Small Reorganized Districts 87

14 Distribution of Paternal Occupations in Large, Medium and Small Reorganized Districts. 92

CHAPTER I

INTRODUCTION

Although great progress has been made over the past twenty years, school district reorganization continues to be a problem of major concern to educators and leaders in general in Wisconsin as in most other states of the Mid-west. Much remains to be done.

Educational leaders are generally committed to the idea that school district reorganization will bring about improvements in our educational program, but evaluative studies of what has been done, with some notable exceptions, seem to be lacking. One exception is a longitudinal study begun in 1949 by Professor B. W. Kreitlow at the University of Wisconsin of which the present study is an outgrowth. His study centers around ten schools; five reorganized and five non-reorganized. Dr. Kreitlow is seeking to evaluate the effects of reorganization in terms of (1) educational opportunities, (2) educational results, (3) educational cost, and (4) community and neighborhood social structure and processes. With these as his problems he outlined the rationale behind his study as follows:

> It is believed by many educators that school improvement is dependent to a large degree upon the administrative structure through which it can be accomplished. The rural Mid-west has tended to maintain an administrative structure which was organized for elementary education during the middle of the nineteenth century. Efforts to change the structure so as to encompass a total rural community in a single school administrative unit have met with persistent opposition. Sufficient progress in school district reorganization has been made in Wisconsin so that it is now possible to compare the effectiveness of the schools in communities with a single school district serving all children from grades K-12 and communities which have maintained the old multi-district structure.[1]

As Dr. Kreitlow puts it, "The problem is to determine whether the type of school district organization in rural communities is related to the outcome of the school."[2] Partial results and findings to date of that study will be referred to later (p. 28) but it should be pointed out here that the results of Professor Kreitlow's and his assistants' work are the basis for the present investigation.

Statement of the problem

The writer proposes in the following dissertation to investigate the nature of the relationships of the size-cost-achievement factors in the reorganized districts of Wisconsin with the aim of identifying the size district and level of expenditure which produce the greatest educational results and to evaluate the reorganized districts by attempting to determine whether or not they are effectively using the cost and size factors to produce greater achievement. If, for example, there is little or no relationship between size of the district and per pupil cost we should know it and seek to understand why. If, on the other hand, it is generally true that reorganized districts spend more per pupil and show better results than the non-reorganized districts, as was found in the Eisemann study[1], we should know if the results (pupil achievement) vary with the size of the district and/or cost. There seems to be some evidence that this is true. Does better education in the form of achievement accompany increased expenditure per pupil in the reorganized schools, as the National Education Association Committee on Tax Education and School Finance[2] and many other writers suggest is true in other schools? Do larger reorganized districts show better educational results than smaller ones? These are questions which need to be answered for the reorganized districts in order to improve education for Wisconsin youth. One way to answer these questions is by constantly seeking the causes for differences in pupil achievement and possible cause-effect relationships among various apparently crucial factors such as size and cost which may be associated with school achievement and successful school management.

---

[1] Burton W. Kreitlow, Unpublished mimeographed materials which may be had by writing Dr. Kreitlow at the School of Education, University of Wisconsin, Madison, Wisconsin.

[2] *Ibid*.

---

[1] Carl Eisemann, "A Restudy of the School Districts in Two Rural Communities to Determine the Effects of Reorganization", (Unpublished Ph.D. dissertation, Department of Education, University of Wisconsin, 1956), pp. 130-133.

[2] National Education Association, Does Better Education Cost More? (The Association, 1959), p. 21.

Legal and Historical High Lights in Wisconsin's Reorganization Movement Since 1939

An investigation of the work done by the men and women who have borne the brunt of the battle for school district reorganization in Wisconsin should be a fitting part of any study concerned with this educational reform movement. Accordingly the first chapter of this study will deal with some of the personalities as well as the legal and legislative high-lights and the rationale of school district reorganization in Wisconsin over the past twenty years. It was just twenty years ago, September 1939, that the opening guns were fired in World War II. Almost simultaneously with that global event the Wisconsin State Legislature "fired" one of the big guns in the opening rounds of its effort for school district reorganization.

The early history of school district reorganization in Wisconsin has been well written by Eisemann[1] and need not detain us here. The contemporary movement to reorganize the school districts of Wisconsin began in earnest with the passage of the

---

[1] Carl Eisemann, "A Restudy of School Districts in Two Rural Communities to Determine the Effects of Reorganization", (Unpublished Ph.D. dissertation, Department of Education, University of Wisconsin, 1956), pp. 5-17.

1939 law which reads in part as follows: "The state superintendent is authorized on his own motion, by order to attach districts with valuations of less than one hundred thousand dollars to contiguous districts."[1] This idea was the work of Victor Kimball, still active as the state department's legal advisor and supervisor of school district reorganization.

Though short and simple and seemingly "tacked" on the act of which it became a part, the "1939 law" had far-reaching effects on the public schools of Wisconsin. In Adams county, for example, the number of districts were cut from eighty-four to twenty-nine by Mr. Callahan's orders. The Milwaukee Journal gave an interesting description of what became a common occurrence in those hectic days. In an article headed, "School Merger Stirs Turmoil", the Journal reported:

> 'It means a big scrap' according to County Superintendent Irvin S. Jones of Friendship. Jones said that at a mass meeting at Friendship it was agreed almost unanimously to appeal Callahan's orders to the Circuit Court.
>
> 'There's real turmoil here', Jones said. 'There will be fifty or sixty appeals, the law requiring each district to appeal separately. The reorganization is objected to on the ground that the people have had no voice in it, and that it will mean more local tax. Some Adams county residents have implored Governor Heil to intercede. Standing firm against this onslaught Callahan said: 'I have been unable to see the Governor, but it makes no difference. This is not his job. The legislature put it up to me.'[2]

---

[1] See Appendix "A".

[2] Milwaukee Journal, "School Merger Stirs Turmoil, July 10, 1940.

These and similar events led to many heated discussions and courtroom sessions across the state over the succeeding months and years. Attempts to overrule Mr. Callahan failed in a noted court case in Wausau. The Milwaukee Journal gave an account of that decision in an editorial entitled, "Gain for School Consolidation".

> The decision of Judge Leicht at Wausau sustaining the constitutionality of the law authorizing the merger of small (school) districts, will be heartening to those who want to improve Wisconsin rural schools....
>
> All the usual arguments were advanced -- that the law was discriminating, that it denied equal protection to the small districts, that it delegated too much power to the state school office. This was simply saying as has been said so often, and sometimes successfully, that the state could not do anything to improve the rural school system by giving it a better kind of organization.
>
> But Judge Leicht says that the classification was not unreasonable, that equal protection under the law was not taken away from these districts, that the constitution was not violated, and he adds a thought that we hope will become the rule in Wisconsin: School districts are quasi-municipal corporations and as such are but the agent of the state for the sole purpose of administering the state system of public instruction.[1]

The Judge and the Journal supported the "1939 law". Earlier the same year the Journal gave wholehearted support to the aging Mr. Callahan in an editorial entitled, "Progress in School Reform", which reads in part as follows:

---

[1] Milwaukee Journal, "Gain for School Consolidation", December 10, 1940.

> State Superintendent John Callahan is using the power the last legislature gave him to make Wisconsin's rural school system into a 1940 model instead of an 1850 model.
>
> He is moving in the direction of better schools, a better deal for the children -- savings to the taxpayer. He needs and should have the support of every Wisconsin citizen who understands what has been wrong with our rural schools and what needs to be done to make them right.[1]

Opponents, of course, would say that the Journal had a pecuniary or business interest in writing thus for Milwaukee readers whose taxes, through state aids, were being used to support the rural schools. There was probably an element of self-interest in the Journal's stand, but, at the same time, opponents were possibly acting from the same financial motives while in addition their position might be challenged from the educational and sociological points of view.

Opposition to the 1939 law did not end here, however, for the next six or seven years a steady stream of irate citizens brought pressure on the State Department of Public Instruction, local and county administrators, and finally on the State legislators to change the law to conform more with their ideas. One notable attempt to change the 1939 law was the introduction of a bill creating local committees with power to review consolidation orders of the State Superintendent.

---

[1] Milwaukee Journal, "Progress in School Reform", Editorial, July 14, 1940.

This bill, authored by Assemblyman (later Governor) Vernon Thomson, Alex Nicol, and Donald McDowell was defeated, it appears, largely through the efforts of various women's groups of the state assisted by the State Department's Mr. Kimball. Opposition to school district reorganization came from many sources and for various reasons. Many felt that the one-room school was an important part of our way of life and should not be destroyed. Among this group was Professor Quincy Doudna, then of Central State College in Stevens Point, now President of Eastern Illinois University, who was also a candidate for the position of State Superintendent of Public Instruction when Mr. Callahan retired in 1948. Writing under the caption, "Rural Education", in the Dairyland News, Dr. Doudna made known his views on the subject of the one-room school as follows:

> 'The country school and the town meeting are all the true democracy we've got left and we'll never let anybody take them away.' With a few colorful words that wouldn't get past the editor of the "Dairyland News", a Crawford County farmer spit in the dirt and said that to me a few years ago.
>
> That his opinion is shared by thousands of Wisconsin farmers is seen in the cries of "dictator" raised against the Administrators of the Consolidation program during the past five years. It is well to remember that many dead democracies were suicides. People in many parts of the world, including Germany, lost democracy by voting to give their powers to

> someone else. Farmers of Wisconsin are doing just that when they vote to close their schools and let someone else control the education of their children.[1]

This type of appeal and reasoning was typical at a time (August, 1945) when the war against the Axis dictators was being brought to a conclusion in Japan as it had been earlier the same year in Europe.

County superintendents, especially in the predominantly rural counties, while not openly hostile to consolidation, were often cool toward these measures to close small schools.

Meanwhile during the war years the State Department of Public Instruction under the direction of Mr. Callahan had closed over 1200 one-room districts. Supporting him in this campaign were two legislators, former Senator Foster Porter of Bloomington and Assemblyman, (now Senator) William Clark of Vesper. On the side of the opposition were such men as Assemblyman Hugh Harper of Grant county, who, together with his friends Attorneys Byrnes and Sanderson, gave the State Department and their other opponents many hours of legislative and legal debate.

In some of these discussions the motives were not always clear. Some attorneys, property holders and board members seemed to oppose consolidation for reasons not always concerned with the social or educational effect of consolidation or the lack of it. Many opponents of reorganization no doubt sincerely believed that the one-room school serves many good purposes and should be preserved. But consider the following state of affairs as described in a previously cited Milwaukee Journal editorial:

---

[1] Quincy Doudna, "Rural Education", Dairyland News, August 13, 1945.

> Here are districts that had one or two or three children in a school, living wholly off of state and county aid. They educated these children, if anybody could call it education, at a cost of $300.00 or more per pupil and passed the bill on to the taxpayers outside their own districts. There were even two districts that had no children at all (Adams county) but had school expenses. H. L. Merritt, high school supervisor, who made the survey, says that in thirty-four districts the local tax levied amounted to $2,117, and that $1,593.00 of this went for school board salaries and expenses. In twenty districts there were a total of ninety-six pupils whose educational affairs were managed by sixty school board members. Such a situation suggests a racket rather than an educational system. It is the little red school house idea run to seed and decayed down to the roots. It is robbing children of their educational opportunities.[1]

The State Department, the legislature and educational leaders in general did not stop with the 1939 law, but soon began urging more drastic and sweeping reforms in school district reorganization. The 1939 law had made possible the reduction in the total number of districts from 7,572 to 6,045. In the opinion of these leaders there was still much work to be done for there remained over 4,000 one-room districts. Another problem was the non-operating district of which there were 773 in 1943. The citizens in these districts with small enrollments generally found it cheaper to transport their children to a neighboring school and pay tuition than to operate their own schools. There was of course the problem of the small high school with which Wisconsin, as was true of many states, was abundantly blessed.

---

[1] Milwaukee Journal, "Progress in School Reform", July 14, 1940.

Another significant maneuver in the school district reorganization campaign was the 1947 law.[1] This law created the county school committees and outlined the steps of a program by which these citizens were to produce a school district reorganization "Master Plan" for each county. Continuing his attack on school district reorganization, Quincy Doudna told his readers in the Dairyland News that they should move up the "heavy artillery" to defeat the 1947 law. This law was passed but was later changed by a 1949 amendment which subjected any proposed changes in district structure to approval by the people of the district in a referendum. The law as passed was administered vigorously by Mr. Watson, the new superintendent, who strongly supported school district reorganization. When he took office in 1949 shortly after the passage of the 1947 law there were 6,045 districts and just eleven years later at the beginning of the 1959-60 school year there were a total of 2,904 districts representing a decrease of fifty-one per cent in the total number of districts. The number of one teacher districts had been reduced from over 4,000 in 1948 to 1,691 in 1959-60, representing a reduction of approximately fifty-seven per cent. The non-operating districts had been reduced by further legislation under Mr. Watson's actions from over 700 districts in 1948 to twenty-six such districts in 1958. Mr. Ralph Jolliffe and Mr. Henry Olson, assistants under Mr. Kimball, gave many hours of service to school boards and local administrators as they wrestled with the technical problems of finance and legal complications of school district reorganization. The cold figures do not begin to tell the story of behind-the-scenes maneuvering and heated discussions which were a part of the daily lives of the men in the State Department and local administrators and school board members as they engaged in efforts to persuade their fellow citizens to "see the light" on educational matters.

---

[1] See Appendix "B".

The latest major school law affecting the organization of school districts was passed in the summer of 1959 and requires that all territory of the state be included in districts operating a high school by June 30, 1962. All territory not so included by that date, "shall be attached to, created into or consolidated with a district operating a high school by order of the county School Committee not later than July 31, 1962."[1] In 1959 approximately thirty-seven per cent of the state's territory was not in a high school district. This law will no doubt bring many radical changes in the district structure within a relatively short period of time and will no doubt be subject to attempts at revision and opposition. A recent parade around the capitol by opponents of the law is clear evidence that there are still those who feel as Dr. Doudna did back in 1947.

---

[1] See Appendix "C".

Over the past twenty years, then, it is obvious that rapid changes have been brought about in Wisconsin's school districts.

Aims and Purposes of Reorganization

What are the aims and purposes of all this activity? To answer this question, which seems to be a crucial one, let us turn to a review of the statements made in this regard by leaders of the movement.

Uppermost in the minds of the leaders of school district reorganization in 1939 was the problem of school costs. Speaking before the Assembly Education Committee in 1940 Mr. Kimball made the following observation:

"The closing of 1,200 schools in Wisconsin with less than fifteen pupils each would save the State $1,400,000 a year."[1]

Not only in Wisconsin but elsewhere a most important aim of reorganization was, and is, not only to save money, but to use the available funds more effectively. Dawson cited studies in Oklahoma, Wisconsin and California indicating the possible effects of school district reorganization on school costs. In Oklahoma it was estimated that school district reorganization would result in a saving for the whole state of $1,417,122, in a total annual budget of $28,098,318, or roughly 5 per cent, and similar results would be had in California and Wisconsin.[1]

---

[1] _Capital Times_, Madison, Wisconsin, April 8, 1943.

James made the following observation in an address given in 1955: "The soundest arguments that have been marshalled for school district reorganization have been economic facts to a large degree: tax bases and tax rates, per pupil costs, pupil-teacher ratios, costs of special services, life income comparisons for different levels of education and community economic development."[2]

A second major aim of school district reorganization is to improve pupil achievement. Fowlkes, in 1945, pointed out in arguing for school district reorganization that, "Wisconsin ranks forty-fourth among the forty-eight states in the percentage of sixteen, seventeen and eighteen year old children who are in high school."[3] Henzlik and Chisholm writing in 1948 said, "There is a tragic waste of funds in Nebraska due to inefficient school district organization. They added this significant word: "Both the taxpayers of the state and the teachers are paying for this waste and inefficiency, while pupil achievement is suffering."[1] One of the great assumptions as shown by this statement and made by most advocates of school district reorganization is that pupil achievement will be improved by these measures.

---

[1] Howard A. Dawson, Floyd W. Reeves; et. al., Your School District, (Washington, D. C., Department of Rural Education, National Education Association), 1948, p. 90.

[2] H. T. James, "Schools and Their Master", Wisconsin School Board News, October, 1955.

[3] John Guy Fowlkes, Quoted from Wisconsin School Board News in The Milwaukee Journal, May 10, 1945.

A third aim of school district reorganization is to increase the size of the attendance units so that the student will have a better chance to develop better personal and social attributes. The size of the school has also been considered important because it relates to the efficiency of the use of funds and the quality of the educational program. In discussing the size factor and its effect on education Henzlik and Chisholm said small enrollments mean:

1. Significantly higher costs per pupil.
2. A very narrow offering of subjects of study.
3. Poor library and laboratory facilities.
4. Frequently a low level of teacher preparation.
5. Many teachers teaching school work for which they have little or no preparation.[2]

Most commonly accepted criteria for good school district reorganization include such minimum size factors as twenty-five to thirty students for each room at the grade school level. In

---

[1] F. E. Henzlik and Leslie L. Chisholm, Nebraska Looks at Her Districts, (Lincoln, Nebraska, University of Nebraska Press, 1948), p. 8.

[2] Ibid.

1958 Conant made his famous recommendation that a high school should be large enough to have at least 100 in the graduating class. This would indicate that the elementary district should have at least 150 in each grade. Dawson and Ellena quote the National Commission on School District Reorganization as making the following conclusions regarding size of attendance units; "No matter what type of organization is adopted, the evidence available has led the commission to conclude that the educational interests of the children will be best served if:

1. The enrollment in the kindergarten and grades 1-6 is not fewer than 175 pupils with at least seven full-time teachers employed, a more desirable minimum being 300 or more pupils with twelve or more teachers.
2. The enrollment in junior and senior high school grades is not fewer than 300 or 75 pupils of each age group with a minimum of twelve full-time teachers.[1]

These and numerous other statements show that more adequate size is considered one of the chief aims and purposes of school district reorganization.

We conclude then that leaders in the school district reorganization movement are working for three basic objectives or aims, namely:

1. More adequate size.
2. Improvement of the quality of education.
3. More efficient use of financial resources.

---

[1] Howard A. Dawson, William J. Ellena, School Executives, July 1954, p. 73.

All three in part help to bring about greater pupil growth in all areas and not the least of which it is assumed is improvement in academic achievement. It will be readily admitted by most observers that these are indeed worthwhile aims and objectives which demand our greatest attention and effort. However, the actual, and not the assumed relationships among these three factors of size, cost and achievement should be a major concern of all who are working for better education. This is the problem on which the present study will focus. More specifically the writer proposes to examine the relationships of size-cost-and achievement at the elementary school level of thirty-nine reorganized districts of Wisconsin, which, with a few exceptions, comprise the total population of such schools in Wisconsin.

Significance of the Study

Cushman pointed out the need for such a study in 1954 in an address before the Midwest Area Meeting of the National School Boards Association when he said: "Few scholars have looked at the relative contributions of both size and cost as simultaneously these two factors in large numbers of school districts explain the variation in the quality of education available to children."[1]

---

[1] M. L. Cushman, Wisconsin School Board News, October and November, 1954.

In view of the importance attached to the factors of size-cost and achievement and the supposed relationships among them the writer believes that a close examination and description of the relationships of these factors in the reorganized districts of Wisconsin will be useful in promoting a better understanding of the inner workings of our schools and perhaps lead to improvement of the educational enterprise. It must be borne in mind that our educational leaders both at the state and national level are committed to the school district reorganization program. The question is not whether we shall have school district reorganization, but rather, is it doing the job it is supposed to do? This study is designed to give part of the answer to that question.

The following chapter will deal with studies that have been made on the relationships of the combinations of the size-cost-achievement factors in various places throughout the United States.

CHAPTER II

BACKGROUND OF THE ISSUES AND REVIEW OF THE LITERATURE

The Rationale of School District Reorganization

Since the present study is concerned with the reorganized districts of Wisconsin, a word or two may be in order to produce an overview of the nature and purpose of the school district reorganization movement as it has developed in the United States. One of the best and most recent discussions of the rationale of this movement is found in a work published by the American Association of School Administrators, a department of the National Education Association. The following discussion of school district reorganization is a paraphrased statement of the more elaborate treatment of the subject found in the work listed below:

A school district is a governmental quasi-corporate unit or device through which the local citizens can work together in organizing, supporting, controlling and operating their schools. These districts were established early in the history of the states and are an arm of the state subject to control and modification by the state legislatures. In the early days most citizens lived in rural areas. Life was sinple and educational demands placed on the schools were met by the one-room little red school house, in which the teacher often had little more schooling than the average eighth grader of to-day. Times changed; cities grew out of the wilderness and educational needs of youth changed significantly. Whereas an elementary education was sufficient for a rural agrarian society in a small nation, the educational needs of youth in a rapidly changing, increasingly urban and industrializing nation rising to a position of leadership among the western democracies were far different and demanded an equally rapidly changing and expanding curriculum, physical facilities, better trained teachers and greater financial resources. The one-room school simply could not meet these demands. The typical one-room school district of a bygone past had to be modified just as the banking institutions, industrial enterprises and farm production methods were changed and adjusted to the times. These small elementary districts and the small village high school are outmoded relics of the past. The logical answer to these problems, say the leaders of school district reorganization, is to change the nature of the school districts to include more territory for a larger tax base and bring more students together in larger and better equipped school buildings. In this way more efficient use can be made of the available funds and facilities. The small elementary and high school districts of fifty years ago should be consolidated wherever feasible with neighboring school districts so that the combined resources and students of the smaller districts can be brought together in a school which will be large enough to function efficiently and improve the quality of education being offered the youth of today. This program is called school district reorganization and has been gathering momentum over the past decade, especially in the rural mid-west in such states as Wisconsin, Illinois, Michigan, Minnesota, Iowa Indiana and Nebraska.[1]

The present study is concerned with an appraisal of the work of reorganization as it has been carried out in Wisconsin. The work along this line continues to-day and shows no sign of abatement as is evidenced by the recent 1959 law requiring all areas of the state to be in a high school district by 1962.

Clarification of the Issues

Since reorganization programs are often concerned with affecting size-cost and achievement relationships in the state's school districts it is believed that an evaluation of school district reorganization would be significantly assisted by a close observation of the relationships of these three factors in Wisconsin's reorganized districts. The task which will concern us here is the gathering of the necessary data on these schools in such a way that reliable comparisons can be made between the various schools, with special reference to the three variables of size, cost and achievement. It is believed that one can thus draw valid and reliable conclusions concerning the nature of these relationships in and among the various districts. The issues involved will require consideration of the questions of the following type:

---

[1] American Association of School Administrators: Commission on School District Reorganization, School District Organization (Washington, D. C., The Association, 1958), pp. 19-23.

1. What relationships and differences exist between the size-cost-achievement factors in the reorganized districts of Wisconsin?

2. What meanings and conclusions can be drawn from these relationships and differences among the thirty-nine districts for the above mentioned three variables?

It is to be determined first of all how much achievement each school is producing in its students in the subjects of reading and mathematics. This has been done as shown in Table I, p. 23, which gives the basic data to be used in this study. By the use of the Pearson-Product moment correlation it can be determined what relationships exist among the size-cost-achievement variables as follows:

TABLE I

Basic Data for the Size, Cost Achievement Relationships in the Reorganized School Districts of Wisconsin

Schools by 1958-59 High School and Elementary Enrollment		Mean Ach. Raw Scores in Reading & Math.	Mean Hennon-Nelson Raw Score	5 yr. Mean cost per Pupil-Operating Expense	1954-1958 5 yr. Ave. Net Elem. Enrollment	
1. Shawano	2511	59	45	$ 218.00	1397	LARGE
2. Ashland	2168	66	48	271.00	1548	
3. Black River Falls	1728	62	48	220.00	1258	
4. Phillips	1373	58	39	242.00	926	
5. Oregon	1068	64	47	209.00	748	
6. Galesville	912	56	46	233.00	652	
7. Bruce	895	61	43	200.00	485	
8. Florence	826	57	46	254.00	608	
9. Marion	826	59	42	220.00	559	
1. Grantsburg	789	68	56	235.00	461	MEDIUM
2. Frederic	753	59	43	309.00	402	
3. Holmen	710	55	40	217.00	416	
4. Niagara	660	63	45	267.00	464	
5. Alma Center	654	64	46	216.00	431	
6. Wabeno	589	60	41	259.00	435	
7. Amherst	554	65	52	207.00	369	
8. Laona	552	56	42	233.00	423	
9. Mellen	550	59	43	254.00	394	
10. Elcho	541	61	43	262.00	425	
11. Trempealeau	522	58	44	260.00	347	

TABLE I--Continued

Schools by 1958-59 High School and Elementary Enrollment		Mean Ach. Raw Scores in Reading & Math.	Mean Hennon-Nelson Raw Score	5 yr. Mean cost per Pupil-Operating Expense	1954-1958 5 yr. Ave. Net Elem. Enrollment	
12. Three Lakes	515	59	43	$324.00	332	MEDIUM
13. Melrose	483	67	49	238.00	319	
14. Wausaukee	406	60	42	194.00	328	
1. Hixton	364	55	40	230.00	268	SMALL
2. Fairchild	345	57	35	213.00	254	
3. Weyerhauser	345	66	46	354.00	191	
4. Almond	324	69	52	163.00	164	
5. Butternut	324	58	45	253.00	236	
6. Bayfield	319	51	37	205.00	184	
7. Woodville	313	74	56	251.00	166	
8. Rosholt	305	52	43	278.00	131	
9. Taylor	304	67	45	244.00	220	
10. Goodman	299	60	45	245.00	180	
11. Dunbar-Pembine	294	58	45	236.00	190	
12. Tripoli	279	65	47	285.00	198	
13. Drummond	267	59	43	345.00	172	
14. Glidden	252	59	42	328.00	153	
15. Princeton	241	53	35	244.00	110	
16. Amberg	141	52	38	216.00	112	

1. Size-achievement relationships
2. Size-cost relationships
3. Cost-achievement relationships
4. Cost-achievement holding size constant
5. Size-achievement holding cost constant

The next problem is to determine whether there are significant differences in achievement among the schools as a group and then by size groups and cost groups. The best measure of these differences is the tests of analysis of variance and/or co-variance. By these processes it is believed that some interpretations can be made concerning the differences in achievement in the various schools and the effects of intelligence and differing home backgrounds can be taken into account.

Clarification of Terms

One of the first concerns at this point in the discussion is the clarification of some terms to be used in the study. For example the word achievement as used here in reference to the thirty-nine reorganized school districts of Wisconsin means achievement in mathematics and reading at the ninth grade level. Educational workers know that the problem of defining and measuring educational quality is a complicated one, but it is reasonably certain that few educators would challenge the statement that reading and mathematics are important areas of the elementary and junior-high curriculum and as such are valid measures of the quality of the school program. The word quality as generally used in describing a school program refers to more than achievement; it often includes the opportunities and facilities available to the students in the schools as well as general achievement and educational outcomes. Hence, when the writer quotes studies in the literature on the following pages which use the word quality in this sense he recognizes that the inferences to be drawn from these studies have certain limitations in their application to the present study.

One could hardly expect to find many research projects dealing with several factors involving school programs which select and treat the factors in identical ways. The next best course which has been done here is to choose those which most nearly approximate the conditions and design of the present study.

"Cost" will be used to mean the per pupil cost for current operating expenses. At times more specific cost categories may be used and specified at that point in the discussion.

For the purposes of the present investigation the term reorganized district refers to those school districts in Wisconsin which meet the following criteria:

1. One which altered its boundaries and the administrative organization during the years 1948-1951 so that several outlying smaller districts became a part of a larger centrally located district.
2. The administrative organization was such that all the elementary and secondary schools of the district were under one school board and one administrator.
3. No more than fifteen per cent of the high school enrollment could be tuition students.

Review of the Literature

Since this study concerns reorganized school districts the review of the literature will be focused first on statements made by educators who have studied the size-cost-achievement variables as they relate to reorganized districts. In 1948 Professor Gregg at the University of Wisconsin wrote as follows:

> The quality and cost of public education in Wisconsin has been and will continue to be influenced to a large degree by the nature of the local school districts. Improved school district structure will result in a greater educational return for each dollar spent for public education.[1]

Dr. Gregg points out that as our school district reorganization program approaches the standards by which it can be called good, benefits will be shown by more efficient use of funds and higher student achievement. This prediction has been tested by Eisemann, who, while using only a small sample, and looking for differences between achievement in a reorganized and a non-reorganized district, found that the students in the reorganized district outperformed those in the non-reorganized district at the end of the first six grades. He also found that the reorganized district spent more money per pupil over the same period.[2] Thus one may question whether the differences in achievement were the result of reorganization or the cost per pupil or perhaps a combination of these or other factors not measured in the Eisemann study.

---

[1] Russell T. Gregg, Characteristics of Good School Districts (Madison, Wisconsin, University of Wisconsin, 1948), Foreward.

[2] Carl Eisemann, "A Restudy of the School Districts in Two Rural Communities to Determine the Effects of Reorganization", Unpublished Ph.D. dissertation, University of Wisconsin, 1956, pp. 130-133.

Using a larger sample, Professor Kreitlow, of the University of Wisconsin, found that the size factor was closely related to achievement, and that the students from larger districts whether reorganized or not outperformed those from smaller districts.[1] The evidence is therefore inconclusive that reorganization as it is being carried out in Wisconsin is really making a difference in the achievement of students.

Size-Achievement Relationships

A study of the size-achievement relationships in Wisconsin schools should be a fruitful area for research in view of the fact that this state is still operating 1,691 one-teacher schools.[2] Of the 415 high schools only 149 have an enrollment of over 300 students and fifty-seven have less than 100. 266, or sixty-four per cent have less than 300 students. Many of these small high schools are among the reorganized districts of the state.[3]

---

[1] B. W. Kreitlow, "Does School Size Make a Difference in Educational Opportunity?", *Wisconsin Journal of Education*, Vol. 91, March, 1959, 8: 17-18.

[2] Department of Public Instruction, Unpublished mimeographed materials, "Tabulation of School District Organization in Wisconsin as of October, 1959", (The Department of Education, Madison, Wisconsin, 1959).

[3] All Wisconsin high schools are included in the figures quoted above.

Some writers have been very certain that the size-achievement relationship is a most important and real one. For example, Dawson says, "There is ample evidence that the size of the school is the most important factor in limiting the opportunities in the small high school."[1] To be sure, Dawson used the term "opportunities" but in the context he might well have included the term "achievement". Henzlik and Chisholm concluded after studying the Nebraska school districts that small enrollments mean, among other things, "A very narrow offering of subjects of study and frequently a low level of teacher preparation."[2] Kreitlow studied the effect of graded and ungraded schools on the achievement in letter writing of rural farm and rural non-farm children at the sixth grade level. He concluded that:

> The farm child attending the graded school rather than a one or two-room ungraded school has a significantly greater achievement (in letter writing) than the farm child who attends the one and two-room ungraded school. This may or may not be true of the other measures of achievement.[3]

While this is admittedly a small segment of the whole achievement picture it is nevertheless a significant finding.

---

[1] Howard A. Dawson, Satisfactory Local School Units, (Nashville; George Peabody College for Teachers, 1934), p. 90.

[2] Henzlik and Leslie L. Chisholm, Nebraska Looks at Her Districts, (Lincoln, University of Nebraska Press, 1948), p. 6.

[3] Burton W. Kreitlow, "A Study of the Teaching of Letter Writing in the Sixth Grade of Graded and Ungraded Rural Schools", Unpublished Ph.D. dissertation, University of Minnesota, Minneapolis, 1949, p. 180.

It would be unwise, however, to suggest at this point that between size and achievement one will always find a high correlation. Since there are so many variables to control one can only say that other things being equal, it appears that the relationship of size and achievement is fairly high and consistent. Atwood found that:

> There is a definite relationship between the size of the high school enrollment and achievement on the Cooperative Intermediate Algebra Test and Cooperative Plane Geometry Test. When those students were grouped according to enrollment in high school from which they were graduated their achievement of these tests, as groups, increased as the high school size increased.[1]

He also found that among these superior students at the University of Wisconsin:

> There was a direct relationship between the number of pupils enrolled in the high schools from which these students came and the number and kinds of mathematics courses they had completed, their mean percentile rank on the Cooperative Intermediate Algebra Test and the level at which they began their University mathematics program.[2]

While Atwood's study, as well as several others to be cited, deals with high school programs and the present study is concerned primarily with the results of the elementary and junior high school programs, it can be reasonably assumed that in a given school the quality of the school program will not vary too much between the high school and the elementary grades, since many of the same variables which control the educational programs operate on both elementary and high schools of the same community with nearly equal force.

---

[1] Harry Mason Atwood, "An Analysis of Achievement by Selected Superior University of Wisconsin Freshmen with Implication for the Development of Enrichment Materials for High School Mathematics", Unpublished Ph.D. dissertation, University of Wisconsin, Madison, Wisconsin, 1955, p. 134.

[2] *Ibid.*, p. 169.

Bertrand's study produced similar results with regard to students at Texas A. and M. Those who came from the small high school to that college seemed considerably lower on the A.C.E. Psychological Examination than did those from the larger high schools. His evidence was inconclusive, however, as will be pointed out later.[1] (see page 34)

Dwyer found that, "Graduates from smaller high schools were found to have a greater drop-out rate at the end of the first year of college."[2]

Boles tested 22,057 seniors in Florida white secondary schools in 1950 and in 1951. Achievement tests were given in English, social studies, natural science and mathematics. He concluded that there was an association between the size of the school and the achievement of high school seniors. Boles stated that:

> It does not demonstrate that school size, per se, caused high or low achievement. The study suggests, however, that there are certain factors associated with school size which do have a causal relationship to achievement. Additional

---

[1] J. R. Bertrand, Journal of Experimental Education, September 1956, pp. 59-69.

[2] P. S. Dwyer, Journal of Educational Research, Vol. 32, 1938, pp. 271-281.

> research is needed to identify these factors and also to determine whether those factors are controllable or uncontrollable.....
>
> The optimum school size group for senior high school in Florida was 2,000 and up as judged from the achievement of the seniors in 1950 and 1951.[1]

Young made a similar study at Purdue on the academic preparation of students on entering, and achievement made after entering, by students from various sized high schools from the State of Indiana. He found a significant difference in the mathematics preparation of students entering the school of engineering. He said: "It appears that students entering the school of engineering from the larger high schools are better prepared in the area of mathematics than students entering from smaller high schools."[2]

If we use the number of electives available to students as a criterion of quality, Wisconsin will serve as an example to show that the number of electives available is closely related to the size of the high school and presumably one could say this would be true of the grade school and junior high schools also, and would, therefore, effect the achievement of the students. The 1957-58 Wisconsin High School statistics data show that those high schools with over 300 enrollment had a mean number of electives available of 9.9, while those under 100 enrollment had a mean number of electives available of 6.3[1] -- a difference of over fifty-five per cent in favor of the larger schools.

---

[1] Ralph C. Boles, "Some Relationships Between Size of School and Academic Achievement of High School Seniors in Florida", Unpublished Ph.D. dissertation, University of Florida, 1952, p. 109.

[2] John Frederick Young, "A Comparison of the Academic Preparation and Achievement of College Students in Indiana", Unpublished Ph.D. dissertation, Purdue University, 1958, p. 99.

The evidence on the question of the relationship between size and achievement is conflicting, as will be shown by the following statement by Dickerson, who said that, "When mental ability is held constant the size of the preparatory high school seems to have very little if any influence on the academic achievement of the student once he reaches college."[2]

This quotation may be somewhat misleading, if we consider the fact that perhaps more students from the larger high school "reach college" and that only those who survive the supposedly inferior academic atmosphere of the small high school continue their education.

Little found that although the number of graduates from Wisconsin high schools where the schools were divided into four size-groups were nearly equal, the number of graduates who were continuing education beyond high school increased with each increase in high school size.[3] But, as Little points out, we cannot take this as prima facie evidence of a cause effect relationship between size and quality because the larger communities may have larger numbers of professional and more highly educated parents.[1]

---

[1] Op. cit. (Statistics summarized by the writer) State Department of Public Instruction, Madison, Wisconsin.

[2] Elbert Dickerson, "An Analysis of the Size of the Arkansas High Schools to Academic Success of Graduates in the First Year at the University of Arkansas", Unpublished Ph.D. dissertation, University of Arkansas, 1958, p. 88.

[3] J. Kenneth Little, Explorations Into the College Plans and Experiences of High School Graduates, (School of Education, University of Wisconsin, September 1959), pp. 17-18.

Borsuk in 1957 found, in studying a group of freshmen and following them until graduation at the University of Wisconsin, that there was no significant difference between persistent (graduates) and non-persistent (non-graduates) students when compared by size of their high school graduating class. In fact he found this to be the only factor among several such as high school grades, rank in class, etc., which did not distinguish persisters and non-persisters.[2]

Bertrand, in a study mentioned earlier, (see p. 31) found that on achievement tests given to freshmen at Texas A. and M. the difference between scores made by students from various sized high schools, when aptitude was controlled, had little relationship to the size of the high school.[3]

This, in some respects, tends to upset the milk jar of the size-achievement relationship theory. One can only conjecture at this point that either there are unknown factors operating in certain of these studies or the research may need sharper instruments and design. Nevertheless, there are conflicting reports which give cause for concern and reflection, and prompt one to further investigation.

---

[1] Ibid., p. 17.

[2] Charles Seymour Borsuk, "A Comparative Study of Persisting and Non-Persisting Students at the University of Wisconsin", Unpublished Ph.D. dissertation, University of Wisconsin, 1959, p. 32.

[3] Op. Cit., pp. 59-69.

Size-Cost Relationship

The next problem to be reviewed in this study is the size-cost relationship in school districts, a seemingly less difficult relationship to measure. With regard to this relationship and school district reorganization there occasionally arises some confusion. As was noted in Chapter I, (see p. 14) some writers on school district reorganization have created the impression that reorganized schools cost less to operate. The facts do not always bear this out. In his discussion on Finance and Reorganization, Dawson makes the following observations:

> While the primary purpose of school district reorganization is not to reduce the total cost of education, but to obtain better educational opportunities and a more effective use of the funds expended for education, it is nevertheless true that in most instances educational opportunity equal to that offered in numerous small units can be obtained for less expense under reorganization. In some wealthy areas reorganization would make possible better and more extensive educational opportunities for smaller expenditures. In a vast majority of cases, however, the schools will require increased expenditures following reorganization for

> *the simple reason that more and better educational services are needed and wanted.*[1]

The underlined portions of Dawson's statement are borne out by the tentative findings of the research project in Wisconsin under the direction of Dr. B. W. Kreitlow and his associates who found that the reorganized districts in his study spent more for educational purposes than the non-reorganized districts, but they also produced greater achievement. The differences in achievement, however, were inconsistent within the two groups of reorganized and non-reorganized schools. In almost every case it seemed that achievement was more closely associated with size and cost than with reorganization, per se.[2] These results give further reason for making a closer observation of the reorganization program in Wisconsin. The fact remains, however, that, as Dr. Kreitlow says, "Too few pupils in a school makes for poor use of your tax dollars."[3] This fact is often overlooked in discussions of school finance.

---

[1] Howard Dawson and Floyd Reeves et. al., *Your School District*, Washington, D. C., Department of Rural Education, National Education Association, 1948, p. 90.

[2] Burton W. Kreitlow, "New Facts on School District Reorganization," Unpublished data which may be had by writing to Dr. Kreitlow, 215 Education Building, University of Wisconsin, Madison, Wisconsin.

[3] Burton W. Kreitlow, *What Shall We Do About Our Schools?* (University of Wisconsin, Extension Services, College of Agriculture, 1951), p. 4.

Woodham emphasizes the cost-size relationship theory when he writes:

> It is a widely accepted fact that the size of a school has a direct relationship to the cost of the educational program. Practically every study dealing with reorganization or with financing public education recognized the existence of this relationship.[1]

Hutchins and Munse report statistics on a national scale which are revealing with regard to the problem of size-cost relationship. The following data were gathered by them for the year 1949-50:[2]

1. Districts with over 7,000 students spent $5,400 per classroom unit. (Group 1)
2. Those districts having fewer than 100 pupils spent about $3,000 per classroom unit. (Group 2)
3. Group 1 spent $213.00 per pupil.
4. Group 2 spent $190.00 per pupil.

The picture is a clear one. The larger districts spent 80 per cent more per classroom unit, but only 12 per cent more per pupil. Clearly the larger districts are furnishing an 80 per cent more expensive educational program for an increased cost of 12 per cent more per pupil. Assuming that this 80 per cent more per classroom unit is being spent effectively it is clear that the students in the larger districts may be getting a richer educational diet at a small increase of cost per pupil, which leads to another problem for consideration; that of the relationship between cost per pupil and school program quality.

---

[1] William J. Woodham Jr., "The Relationship Between the Size of Secondary Schools, The Per Pupil Cost and the Breadth of Educational Opportunity", Unpublished Ph.D. dissertation, University of Florida, 1951, p. 33.

[2] Clayton Hutchins and Albert Munse, "Expenditure for Education in Various Sizes of School Districts", Washington, D. C., School Life, Vol. 35, U. S. Printing Office, May 1953, pp. 127-128.

The Cost-Achievement Relationship

The N.E.A. Research Division presented the question of the Cost-Achievement relationship, and its complications as follows:

> What is the relation of school quality to high or low school expenditure over a period of years? Before presenting the answer, it should be recognized that the definition and measurement of educational quality are in the beginning stages of development. But we know that regardless of how quality is defined, it is the result of many factors operating over a considerable period of time. The school is one environmental factor influencing educational performance. So also, are the home, church, press, radio, television and other cultural elements. Then too, the outcome of schooling is strongly affected by native ability and scholastic aptitude. These relationships suggest that there are no easy answers to the question posed.[1]

It is well to remember that "there are no easy answers" to finding the cost-quality relationship. There are some, however, who are very certain that there is a strong and almost certain relationship between cost and quality. For example Mort and Vincent reach the following conclusion:

---

[1] N.E.A. Research Division, Research Bulletin Vol. 37, No. 2, Washington, D. C., April 1959, p. 41.

"The most powerful of all the factors which influence the quality of the schools is the level of financial support."[1] This is a strong statement coming from such well known workers in the field of school finance. The above quotation, made in 1946, also represents the thinking of these men in the light of later research. At a later date Mort and Reusser made an even stronger statement in this connection. Consider the following written in 1951:

> It is the author's belief that few things about the operation of schools can be spoken of so surely as this relationship between expenditure and educational quality. It is strong enough to serve as a basis for more vigorous support for any community. It is strong enough to spur any state to seek a more adequate foundation level. It is strong enough to encourage us as a nation to work for a foundation level nation wide far beyond anything which is currently proposed.[2]

They were not alone in making such sweeping claims for greater financial support. Norton and Lawler are even more specific in claiming a cause-effect relationship between cost and quality as they wrote:

> You get what you pay for....In well financed schools will generally be found the best teachers, excellent buildings and equipment, many fine books, and a well-rounded curriculum. These superior schools will not only give superior instruction in the 'Three R's', but will provide health education, character education, and similar instruction which adds up to an adequate school program.

---

[1] Paul Mort and W. S. Vincent, A Look at Our Schools (New York: Cattell and Co., 1946), p. 41.

[2] Paul Mort and Reusser, Public School Finance (New York: McGraw Hill, 2nd edition, 1951), p. 140.

> In poorly financed schools, one will generally find a very different situation -- less competent teachers, miserable buildings and equipment, few books, and a meager curriculum. These poor schools will not only provide for training in the three R's, but they send forth young people ill-equipped to earn a living and to take their part as citizens in a modern world.[1]

One could hardly find more specific or pointed statements than these by eminent men in the field of public school finance. Their position seems to be supported by the research of such early workers as Powell and Mort, but these results are questioned by later writers. In 1933 Powell made a study of the educational returns of one-teacher schools with varying amounts of expenditures per pupil in one county of New York. Using such criteria as achievement in regular school subjects, reading, spelling and arithmetic, he found the students in the higher expenditure schools to be consistently better than those in lower expenditure schools. He also found that the higher expenditure schools employed more experienced teachers. Powell reached the following conclusion:

> From the evidence uncovered in this investigation it is established with practical certainty that in one-teacher schools, educational expenditures and returns in the form of actual pupil achievement do rise and fall together. The higher the expenditures the higher are the returns.... Expenditures in themselves are of course not directly causal. It bebomes a question of what

---

[1] John K. Norton and E. S. Lawler, Unfinished Business in American Education, (Washington, D. C., the American Council on Education, 1946), p. 5.

> the higher expenditures do bring in higher degree, and which of these factors obtained in higher degree might possibly be more directly responsible for the higher achievement of the higher expenditure school pupils. There is the possibility of higher salaries, and perhaps better teachers with more training for their work, and possibly with more previous experience in teaching, and possibly more able to successfully direct the learning of larger groups of pupils. There is also the possibility of better buildings and grounds with better teaching equipment, etc.[1]

Although this is one of the older studies in the area of the cost-quality relationship and is substantiated by subsequent workers with the same results, a weakness in Powell's design seems to be that he overlooks the effect of and does not control the socio-economic background of the students involved. He says only that the schools are in a rural setting far enough away from New York City to be in no way suburban to it, and near enough to New England to be heir to defense of the free public school, but he does not analyze the home backgrounds of the students whom he used in his study.

Woollatt made a study of varying high expenditure schools and compared them on the basis of educational returns in such things as skills, knowledge fields, special aptitudes and behavior patterns. He concludes:

> Just as we have seen that there is a general increase in the quality of schools as cost increases, so it is evident that there is a general increase in

---

[1] Orrin E. Powell, Educational Returns at Varying Expenditure Levels (New York, Teacher's College, Columbia University, 1933), p. 32.

> skills, knowledge fields, special aptitudes and behavior patterns. ....Spending more to get more is established as an axiom in preparing school budgets.[1]

The observer making use the "The Growing Edge", an instrument for evaluating the classroom procedures of the teacher, does not actually measure the performance of the students in the areas mentioned. Apparently Woollatt assumed that the criteria by which he evaluated the teacher's classroom methods have almost a one to one relationship with the achievement of the student, for no where does Woollatt show the results of tests given to the students. Figure 1 taken from his study shows a high correlation (.60) between the scores made by the schools when measured by the "Growing Edge" and the amount spent per pupil in these schools, a striking example of the cost-achievement relationship.

Writing on the subject again in 1960, Mort, Reusser and Polley are even more positive of this relationship than they were in 1951:

> It seems difficult now to believe that there could ever have been any serious doubt as to the relationship between expenditure level and quality. But there was much wishful thinking that after sufficient money had been spent to get a school established the effect of the expenditure level would taper off. The doubt, whatever its origin, had a great deal to do with the prosecution

---

[1] Lorne Hedley Woollatt, The Cost Quality Relationship on the Growing Edge, (New York: Metropolitan School Study Council, Bureau of Publications, Teacher's College, Columbia University, 1949), p. 65.

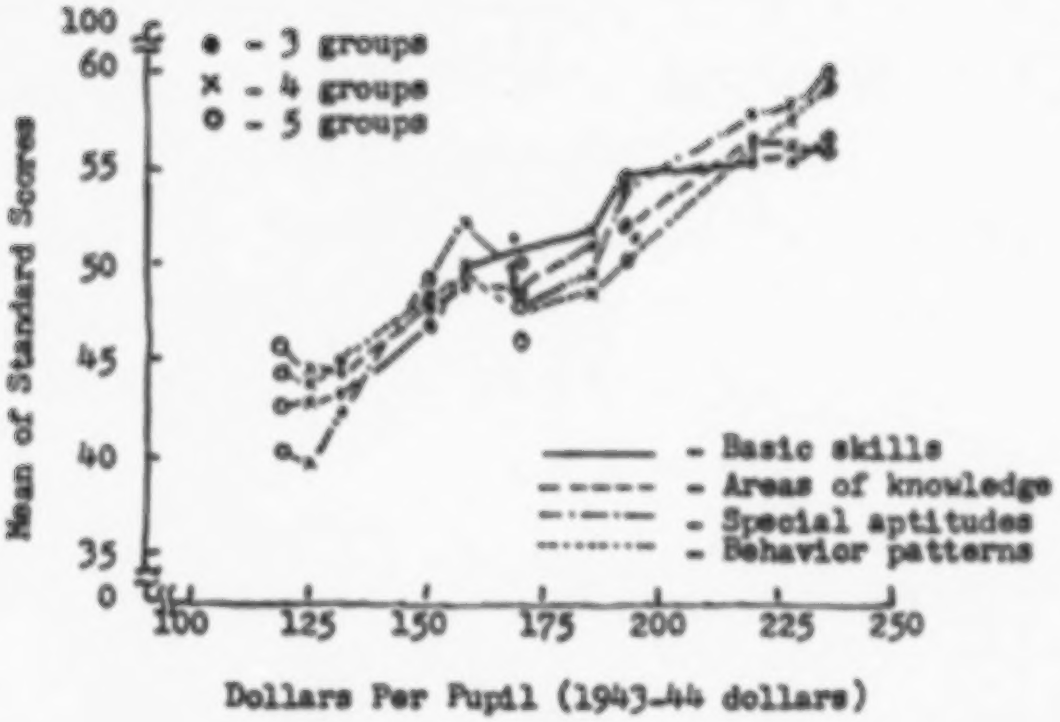


Figure 1. Phases of educational quality related to expenditure per pupil. (from Lorne H. Woollatt, The Cost Quality Relationship on the Growing Edge, Bureau of Publications, Teachers College, Columbia University, New York, 1949, p. 56)

> of the cost-quality studies. That there has as yet appeared no indication of a point on the scale beyond which an expenditure level does not yield commensurate returns is therefore significant.[1]

Johns and Morphet, also writing in 1960, take a much different stand on the matter:

> The case, however is not closed. Some laymen and educators still contend that schools should be rated by the progress of pupils in acquiring skills and knowledge and not by criteria which attempt to list desirable features of an educational program. Many additional studies will undoubtedly be needed before final statements can be made as to conditions under which increased expenditures result in increased quality.[2]

So the arguments go on. More in agreement with Johns and Morphet are these comments written by Burke in 1959:

> The relationship of cost to quality is one of the most challenging, important, and difficult phases of research in school finance. The major hurdles include formulating criteria of quality, devising means for describing or quantifying quality, controlling factors other than schooling which might affect the quality measure, obtaining uniform and complete expenditure data, and controlling factors other than finance which might affect schooling.
>
> Research to date merely has provided useful hypotheses or clues which need to be substantiated. .... A recent study in Connecticut found little relationship between expenditures level and achievement.

---

[1] Paul R. Mort, W. C. Reusser and J. W. Polley, Public School Finance, 3rd edition (McGraw-Hill Book Company, Inc., New York, 1960), p. 86.

[2] Roe L. Johns, Edgar L. Morphet, Financing the Public Schools, (Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1960), p.p. 15-16.

> Since achievement is highly correlated with intelligence and home background it is apparent that in the sample these factors were not correlated with expenditure level. This study raises the question when intelligence and home background are held constant, what is the relationship of expenditure level to achievement? ....The problem of relating expenditures to school quality are far from being solved.[1]

Burke has more to say on this subject as he continues:

> Research has tended to substantiate the correlation between various measures of school quality and expenditure levels. Yet it is probable that communities which tend to have higher expenditures (except where these are the results of inefficiency) tend to be the communities with the conditions essential for obtaining high quality with the money. This poses a number of problems: Identifying the right combination of factors, finding means to bring about these combinations in lagging communities, or discovering workable substitutes for these forces when they do not exist. If these problems are approached from the finance side, then it becomes necessary to learn to what extent money alone or money in combination with controllable factors will lead to school improvement.[2]

These comments coming from one of the leaders in the field of school finance today bear careful consideration for they represent a point of view quite different to that of Mort and Reusser and others. Burke says the relationship between expenditures and school quality is far from being solved while Mort and Reusser say that, "Few things can be spoken of so surely as this relationship". Obviously not all observers agree on this subject. It is also obvious that further investigation in this area would be useful.

---

[1] Arvid J. Burke, "Finance, Public Schools", _Encyclopedia of Educational Research_, ed. Chester W. Harris (New York: The McMillan Company, 1960), p. 556.

[2] _Ibid._, p. 556.

Size-Cost-Achievement Relationships

The final stage of the review of the literature concerns studies of the combined size-cost-achievement and/or quality relationships. Johns and Morphet state that: "Very few studies have attempted to show the complex interrelationships between size of school on the one hand, and both adequacy and per capita costs on the other".[1]

One study which seems to have done this was carried out by Henzlik and Chisholm who concluded, after studying the Nebraska school districts, that small enrollments mean:

1. Significantly higher costs per pupil.
2. A very narrow offering of subjects of study.
3. Poor library and laboratory facilities.
4. Frequently low level of teacher preparation.
5. Many teachers teaching school work for which they have little or no preparation.[2]

These findings generally agree with the observations of most workers in the area. The 1957-58 statistics of Wisconsin high schools show that, "As the enrollment of the school increases the offerings increase and the per pupil costs decrease.

---

[1] R. L. Johns and E. L. Morphet, Editors, Problems and Issues in Public School Finance (New York: Bureau of Publications, Columbia University, 1952), p. 82.

[2] Frank E. Henzlik and Leslie L. Chisholm, Nebraska Looks at Her Schools (Lincoln, Nebraska: University of Nebraska Press, 1948), p. 6.

These decreased costs are reflected in a lower local tax rate for high school purposes."[1] These statistics are summarized here by the writer:[2]

Enrollment	Number of Electives	Average Cost A.D.A.
to 100	6.38	$ 551.22
over 300	9.91	415.33

It is reasonable to assume from these data that the Wisconsin High Schools and the Nebraska schools are similar in important aspects related to the present discussion. The smaller schools cost more and offer a more restricted curriculum. Chisholm summarized major research findings on the size-cost-quality relationship as follows:

> 1. The majority of the local school districts in the United States are ineffectively and inadequately organized in terms of the need of a modern program of education and the efficient expenditure of school funds.
> 2. As the size of the school becomes larger, up to a certain limit, the quality of its educational program generally becomes more satisfactory and the per capita costs of this educational program generally declines.
> 3. The per capita cost of education and the quality of the educational program are generally considered unsatisfactory in elementary school attendance units having fewer than 250 to 300 pupils, except as the cost is greatly increased.

---

[1] Department of Public Instruction, Unpublished mimeographed data on Wisconsin high school statistics, Madison, Wisconsin, Department of Public Instruction, 1959.

[2] *Ibid*.

> 4. School district reorganization generally may be expected to result in: The same educational program at a lower cost; an improved educational program at the same cost.[1]

In conclusion we may safely say that the findings as reported by various weiters here give clues and areas for further study, but not all agree on certain crucial points. It appears that of the three relationships discussed here, only one, that of the size-cost relationship is fairly well agreed upon by most writers. While the size-achievement relationship, the cost-achievement relationship and the combined size-cost-achievement relationships are not too well established, or their exact nature is not known with a high degree of certainty. The problem of designing a study to determine in part the relationships of these factors in the reorganized districts of Wisconsin is the next task on which the discussion will focus.

---

[1] L. I. Chisholm and M. L. Cushman, Problems and Issues in Public School Finance, Johns and Morphet, Editors, (New York: Teacher's College, Columbia State University, 1952), pp. 103-104.

CHAPTER III

SOURCES OF THE DATA AND DESIGN OF THE STUDY

The success or failure of projects such as reported in this study would seem to depend upon three factors: (1) The soundness of the logic or reasoning behind the plan or design of the study, (2) The effectiveness of the tools or instruments which the researcher uses in the collection of data, (3) The skill and reasoning power with which the worker applies the tools to finding answers to his questions or in reaching his goals. The next three chapters will deal with these three aspects of the study. Chapter III will contain the sources of the data and the "plan of attack" or design of the study and the instruments (tests) to be used for measuring relationships and differences. Chapter IV will include an analysis of the relationships, while Chapter V will be focused on an analysis of the differences.

To review briefly the questions to be answered by the present research, are: (1) What relationships exist between size-cost and achievement in thirty-nine reorganized school districts, (2) What differences exist among the schools in size, cost and achievement, (3) Which of these school districts is producing greater achievement in reading and mathematics for elementary students, (4) What is causing these differences in achievement, (5) What conclusions or implications can be drawn from these facts for improving the reorganized school districts of Wisconsin?

The first step in arriving at answers to these questions would appear to be that of gathering the necessary data essential to accomplishing the purposes of the study.

Sources of the Data: The Schools Chosen

All the reorganized school districts of Wisconsin which were reorganized between 1948-1951 with the exceptions stipulated below are the schools used in this study. Accepting these as a total population, a basis for a descriptive study is established. The exceptions are:

1. The five reorganized districts of Wisconsin in the University of Wisconsin's longitudinal study, namely: Winneconne, Kendall, Port Wing-Iron River, East Troy and Blue River.
2. The two districts on which required data were not available. One school had a flu epidemic at the time of the testing program and consequently could not give the achievement tests. Another school failed to give the Henmon-Nelson Intelligence test to the freshmen and therefore had to be dropped from the study.
3. Those districts whose current enrollment of high school students was composed of 15 per cent or greater non-resident or tuition students were not used because they were not considered sufficiently reorganized to make a valid study of this type of district.

The Size Data

When these districts were removed from the original list, thirty-nine schools remained. Since this study calls for an analysis of the size factor and its relationship to other factors connected with these districts, the thirty-nine schools were divided into three size categories based on the total enrollment, K-12, for the 1958-1959 school year. The data were taken from the Preliminary Reports filed in the office of the State Superintendent of Public Instruction, State Capitol, Madison, Wisconsin. These data provide the following size groups, (1) Large: Over 800 enrollment, N=9, (2) Medium: 400 to 800 enrollment, N=14, (3) Small: Less than 400 enrollment, N=16. (See Table I, p. 23).

The Students Used in the Study

The subjects used are the ninth graders who spent their entire school career in the district, making a total population and not a sample. These students were chosen because they were the first class, in most cases, which started school under the reorganized district setup.

The Cost Data

Elementary enrollment data for a five year period, 1954-1958, also collected from the annual reports for these districts were used in getting average elementary enrollments and for calculating

2

mean costs per pupil in the same five year period. The financial data related to the per pupil costs were also gathered and tabulated for each school. From these and the five year enrollment data average costs per pupil were calculated for each district.

Measures of Achievement

Measures of pupil achievement were taken by the administration of the reading and mathematics sections of the Sequential Test of Educational Progress, published by Educational Testing Service of Princeton, New Jersey.[1] These new tests were selected because of:

1. Their wide use in Wisconsin schools (through the University of Wisconsin Student Counseling Center).
2. Easy administration and ease of scoring.

Several writers have recommended the STEP Tests. Rothney, writing on the validity of tests says that, "The new Sequential Tests of Educational Progress series promises to provide adequate validity data to the test user."[2]

Buros, reporting an evaluation of the Sequential Tests of Educational Progress said, "'STEP' is a superior battery on all counts ranging from the technical aspects of construction to the matter of preparation of test booklets and readable manuals".[3]

---

[1] See Appendix "D".

[2] J. W. M. Rothney, Paul J. Danielson and Robert A. Heimann, Measurement for Guidance (New York: Harper and Brothers, 1959), pp. 342-343.

[3] Oscar K. Buros, The Fifth Mental Measurement Yearbook (New Jersey: Gryphon Press, 1959), p. 75.

Listing the same tests under Important Educational Achievement Batteries, Cronback says, "This (STEP) battery of tests is particularily likely to encourage teaching for understanding".[1] Only the reading and mathematics sections of the series were used since these two subjects form the core of subject matter taught in most elementary schools, and the achievement area was one in which there were noticeable differences in the base study made by Eisemann.

Measure of Intelligence

The measure of individual intelligence used was the Hemmon-Nelson test which is widely used in Wisconsin High Schools in a testing program which has been in effect for some twenty-five years. Most Wisconsin high schools participate in this program and the test has particular validity for the students of this state. Rothney discovered that the correlation between college achievement and the Henmon-Nelson score for Wisconsin men was higher than any other measure used in his study of predicting success in college.[2] He also found that, "Only the scores from the Henmon-Nelson Test of Mental Ability and the Differential Aptitude Test discriminated significantly between those who had made better than usual progress in employment and those who had not".[3] These statements might be considered support for the strength of validity of the Henmon-Nelson test although Cronbach says, "For most children, a group mental test leads to the same prediction that a comprehensive achievement test would".[1] In discussing the Kuhlmann-Anderson Test Cronbach concluded that about half the individual differences in I.Q. are due only to random errors and that, "A similar conclusion would hold for other heterogeneous group tests of mental ability".[2] The writer would question the conclusions of Mr. Cronbach on this point, for it may well be that high correlations between total achievement and scores on group mental ability tests only indicate that intelligent students do better in school work while slower students do poorer work. The fact that there is an overlap of 71 per cent between intelligence measures and measures of achievement as Cronbach points out,[3] could be evidence that the school is making use of the student's 'native intelligence' to a large extent in its instructional program. The point of this discussion would seem to be that we must have some means for measuring differences in 'native intelligence' in the students we are working with in each of the thirty-nine schools in order to determine if any differences in achievement are due to difference in capacity or other influences such as the size of the school or the cost per pupil, and we must use the best and most available instruments. The Henmon-Nelson test seems to meet these criteria well.

---

[1] Lee J. Cronbach, Essentials of Psychological Testing Second Edition (New York: Harper and Brothers, 1960), p. 384.

[2] John W. M. Rothney, Guidance Practices and Results (New York: Harper Brothers, 1958), p. 459.

[3] *Ibid.*, p. 412.

---

[1] Lee J. Cronbach, Essentials of Psychological Testing Second Edition, (New York: Harper Brothers, 1960), pp. 224-225.

[2] Ibid.

[3] Ibid.

The last source of information was the student questionnaire,[1] which asked for the occupation of the student's father and the number of years in two types of elementary schools, (One room and schools where only one or two grades were taught in each room). Using the Minnesota Paternal Occupational Rating Scale each student's father or guardian was given a rating and this score was then added to the other information being gathered on each student and tabulated for future transfer to I.B.M. cards.

Assumptions

Certain basic assumptions were necessary in the planning of the design of this study:

1. First and foremost is the assumption that all school districts have as one of their objectives the teaching of basic skills in reading and mathematics.
2. Student achievement as measured by reading and mathematics tests is an important criterion for evaluating a school district.
3. The achievement tests are assumed to have been given under very similar conditions since all persons administering the tests were given specific instructions to follow and cautioned to be extremely careful in following these directions.[2]

---

[1] See Appendix "E".

[2] See Appendix "F".

4. Since all the schools but two which met the criteria of reorganized districts are included, the population of this study is considered to be normally distributed in respect to the general population of reorganized districts.

Design of the Study

The purpose of this study might be restated as seeking answers to the following questions:

1. Are there significant relationships among the thirty-nine districts with regard to the factors of size, cost and achievement?
2. Are there significant relationships for the size, cost and achievement factors when the districts are divided into large, medium and small schools?
3. Are there significant differences in achievement among the thirty-nine schools when grouped into the three size groups, large, medium and small when the factors of pupil intelligence and paternal occupation are partialled out or held constant?
4. Are there significant differences in achievement among the farm students when they are grouped in high, medium and low cost schools?

The basic questions to which answers are being sought here may be restated as follows:

(1) Are their significant relationships among the thirty-nine districts with regard to the factors of:

(a) size and cost?
(b) size and achievement?
(c) cost and achievement?

(2) Are there significant relationships among the districts for the factors of size, cost and achievement as the schools are grouped by size, cost and achievement? Grouped by size, the schools numbered: large; N=9, medium; N=14, and the small; N=16.

When the schools are thus arranged we will study the relationships of:

(a) size and cost
(b) size and achievement
(c) cost and achievement

The three null hypotheses to be accepted or rejected are as follows:

Hypothesis I: There are no significant differences in achievement among the students in the three size groups of schools, small, medium and large.

Hypothesis II: There are no significant differences in achievement scores for farm students in the three size groups, small, medium and large, when intelligence is partialed out.

Hypothesis III. There are no significant differences in achievement among farm students in high, medium and low cost schools when intelligence is partialed out.

The last two hypotheses will deal only with farm students in an effort to study the effect of size and cost on the achievement of a more homogeneous group on the theory that more valid results will be given when the socio-economic background of the students is controlled.

Having stated that the goals are to answer the three basic questions and to accept or reject the foregoing null hypotheses, the next procedure is to organize the data and select the statistical tools which, with proper use, will yield the best results.

Summary of the Data

The first step will be that of summarizing the necessary data in such a way that the statistical tests may be run. Summary Table I shows the list of the thirty-nine schools, the 1958-59 enrollment, mean achievement raw scores, mean Henmon-Nelson raw scores, the mean five year cost per pupil for current operating expenses for elementary purposes and the five year mean net enrollment in the elementary schools for the years 1954-58. The mean scores for the achievement tests combine the raw scores of each pupil in both reading and mathematics. The means are calculated for the number of students included in the study from each school. (See pp. 23-24)

The distributions of the means as shown by Figures 2 and 3 for the size factor, clearly indicate that the great majority of the districts under observation here are small schools by most standards. Figure 2 reveals that over half of the schools (twenty-five) had a net enrollment in both high school and elementary school for 1958-59 of less than 600 students. The facts are even more startling in Figure 3 which shows that over a five year period the average net enrollment in the elementary schools of the thirty-nine reorganized districts, thirty-one had less than 500 students, while twelve had less than 200 students.

Figures 4, 5 and 6 show the distributions for the factors of achievement, costs per pupil and Henmon-Nelson raw scores in that

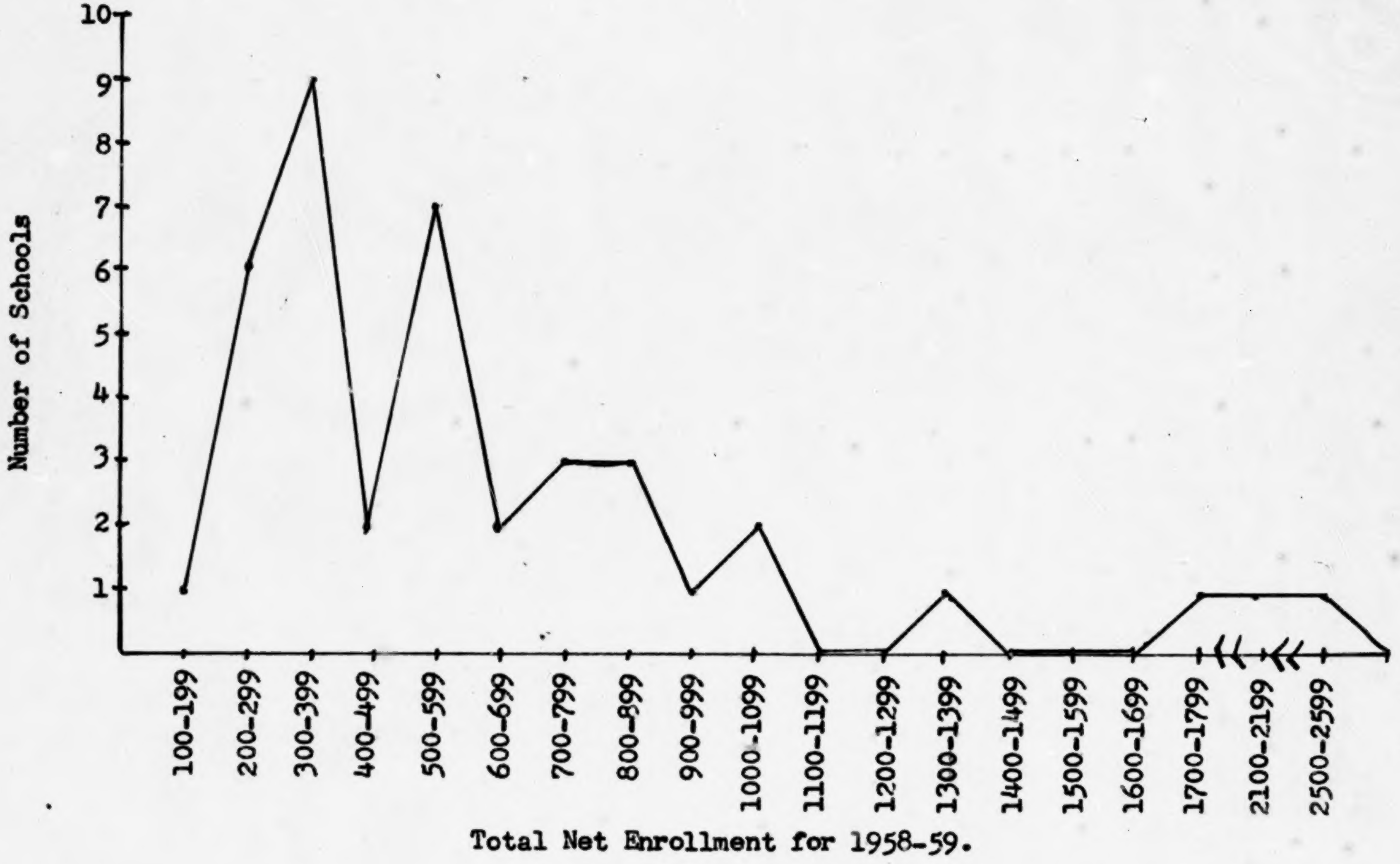


Figure 2. Distribution of 1958-59 Total Net Enrollment in Thirty-Nine Reorganized Districts of Wisconsin.

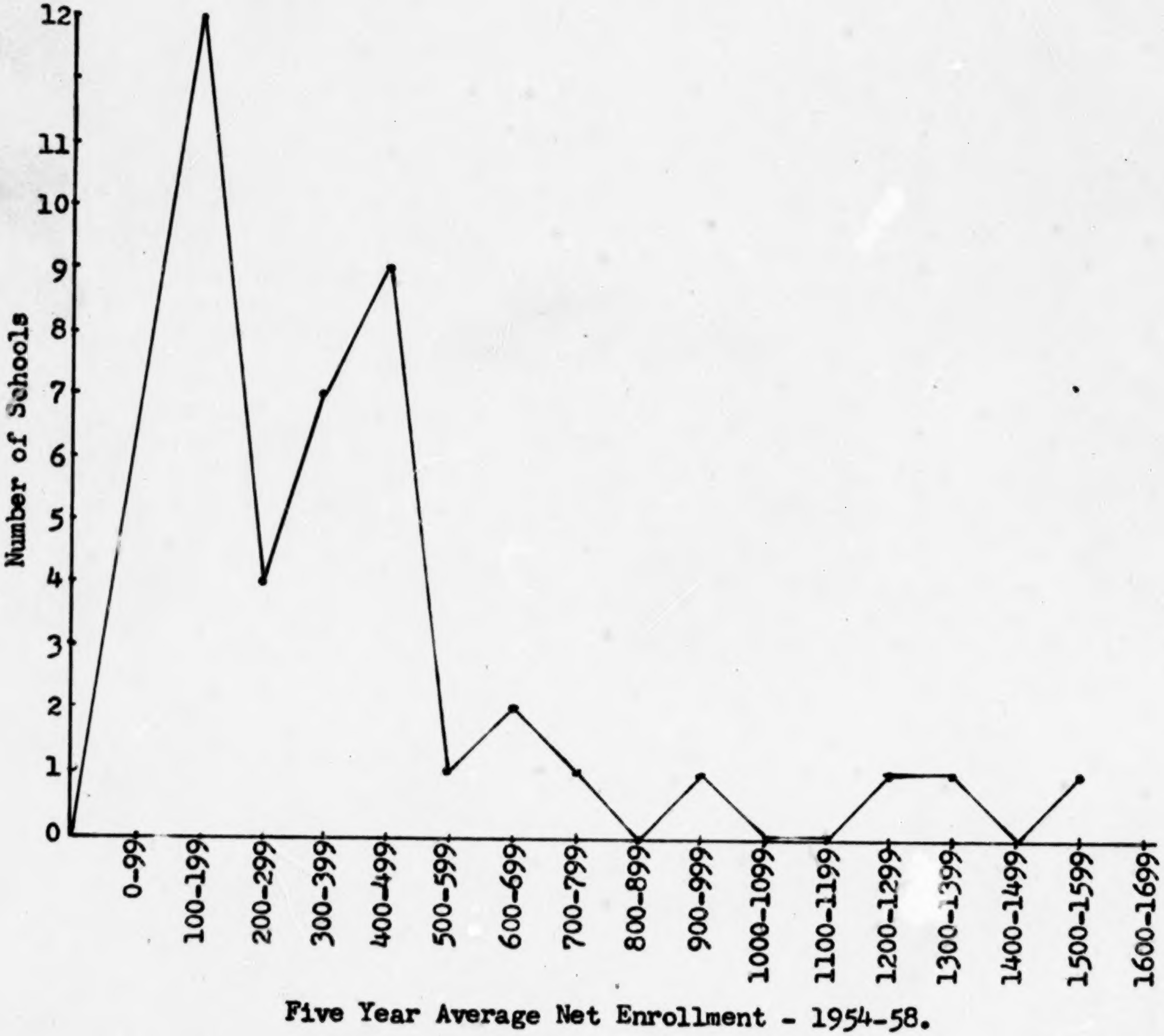


Figure 3. Distribution of Five-Year Average 1954-58 Net Enrollment in Elementary Schools in the Thirty Nine Reorganized Districts of

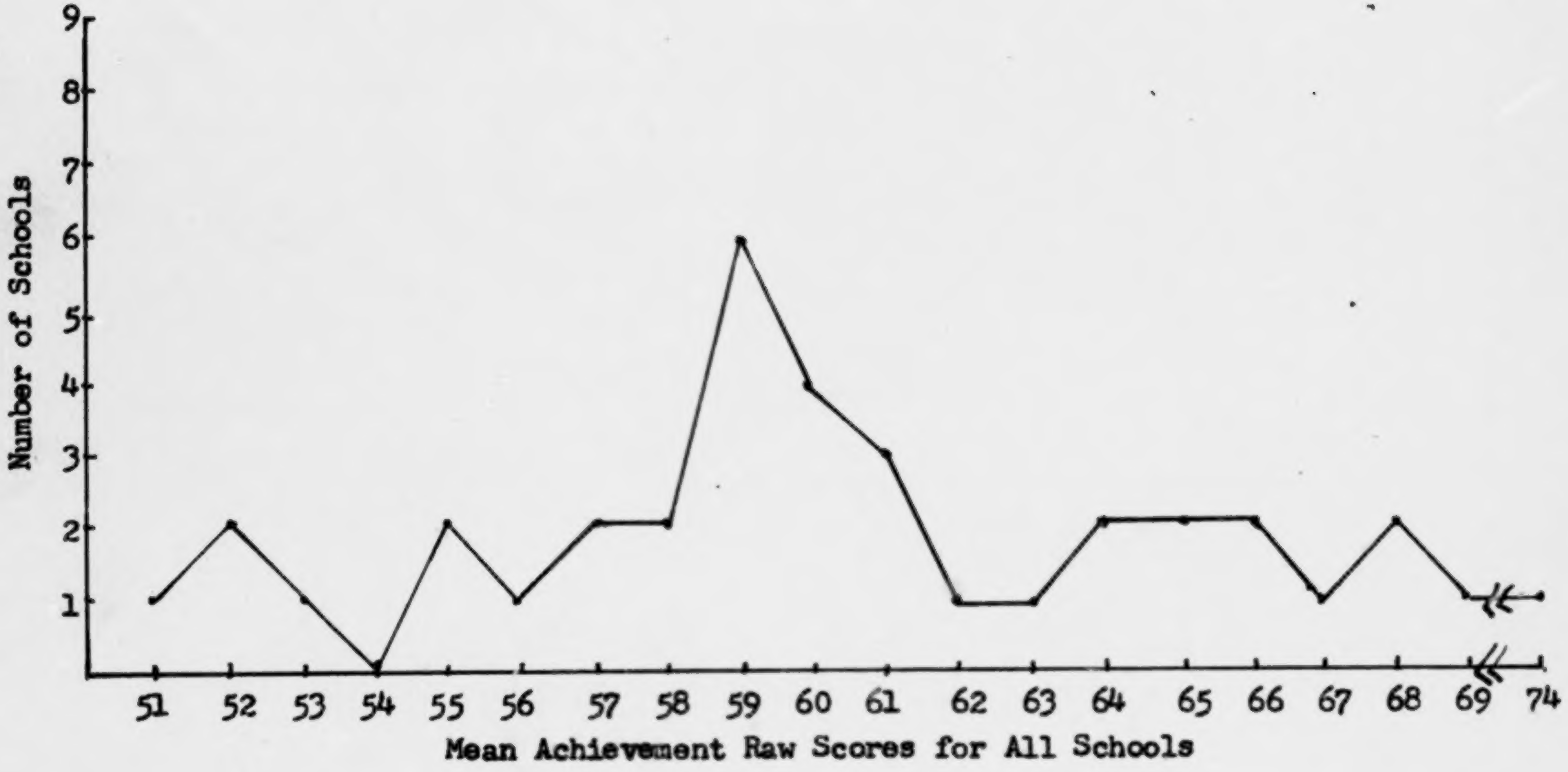


Figure 4. Distribution of Mean Achievement Scores in Reading and Mathematics for the Thirty-Nine Reorganized School Districts of Wisconsin.

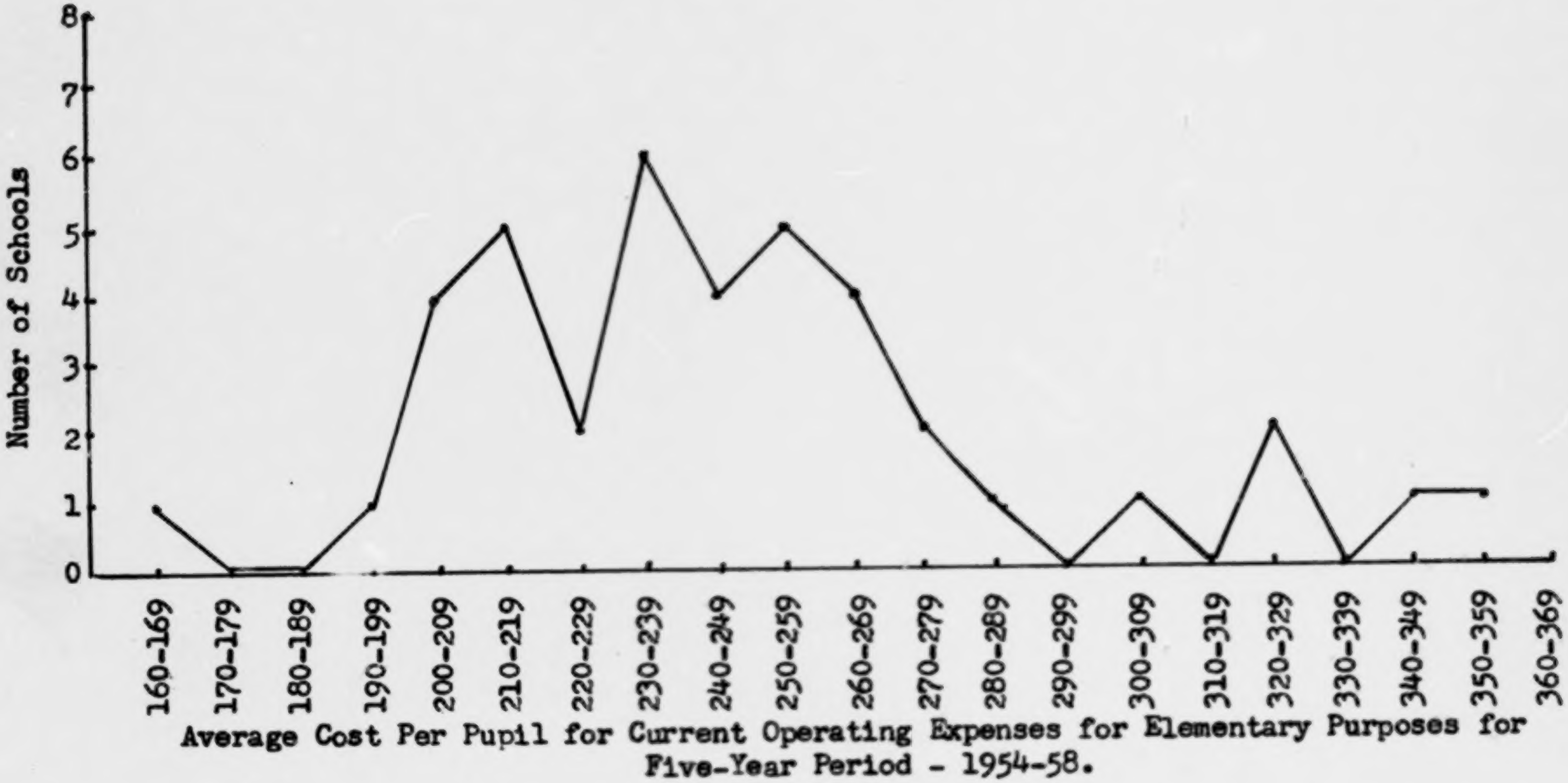


Figure 5. Distribution of Per Pupil Costs for the Thirty-Nine Reorganized School Districts of Wisconsin.

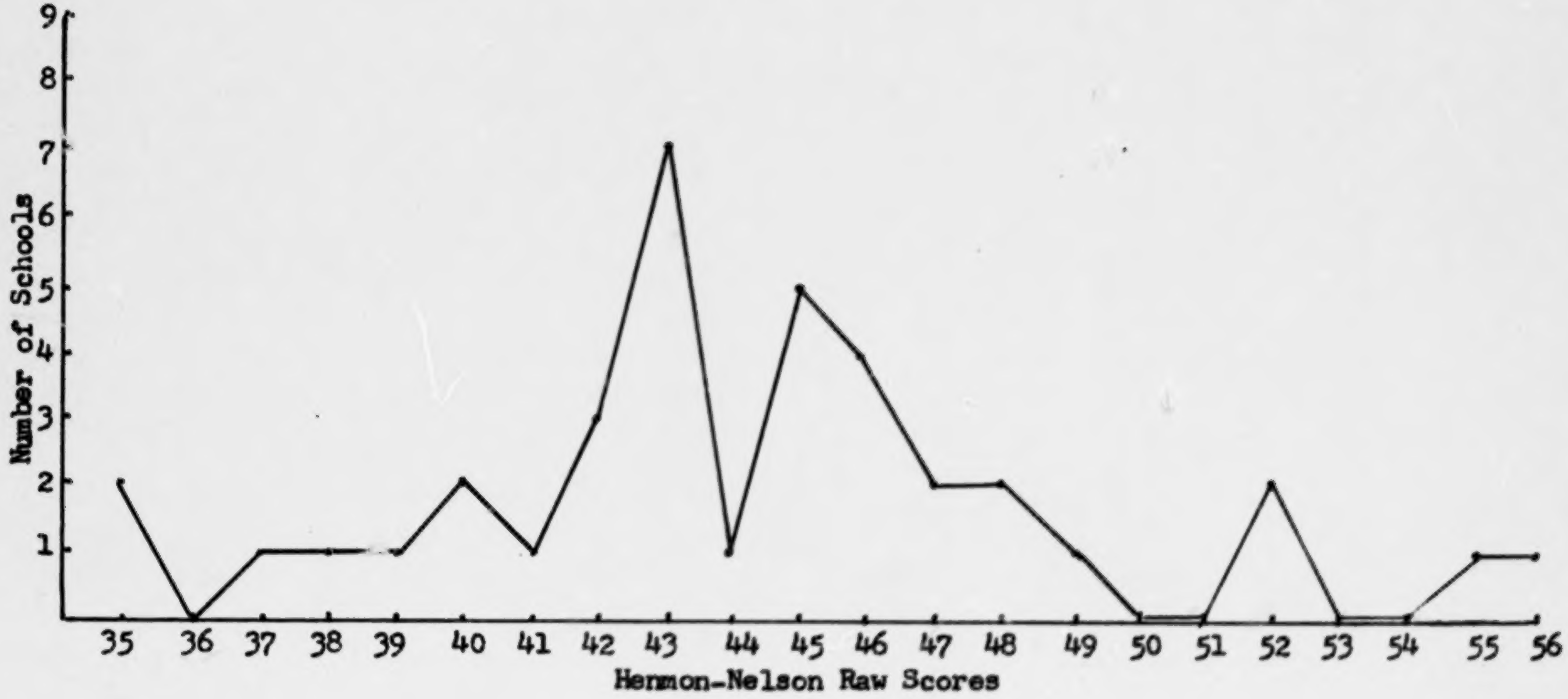


Figure 6. Distribution of Mean Henmon-Nelson Raw Scores for Thirty-Nine Reorganized School Districts of Wisconsin.

order. All three of these curves seem to be skewed slightly to the left, however, this may or may not be significant since the schools vary so widely in enrollment and other factors.

Statistical Measures to be Used

The Chi-square test will be used to test for goodness of fit to determine if the distribution of achievement and Henmon-Nelson scores is normal.

Since this study is seeking to measure the relationships among the factors of size, cost and achievement the Pearson-Product Moment Correlation will be used to determine these relationships. The formula to be used is:

$$r = \frac{\Sigma XY - \Sigma X \Sigma Y}{\sqrt{(\Sigma X^2 - X \Sigma X)(\Sigma Y^2 - Y \Sigma Y)}}$$

The level of significance of the Various Correlations will be based on Garrett's Classifications as shown here:

r = ± .10 to ± .20 denotes indifferent or negligible relationship

r = ± .20 to ± .40 denotes low Correlation point but slight

r = ± .70 to ± 1.00 denotes high to very high relationship

For some reason which he does not explain Garrett omitted the .40 to .70 correlation range. This being the case the writer will modify Garrett's Classifications to include this range. This will change his Classification to appear as follows:

r = ± .00 to ± .20 denotes indifferent or negligible relationship

r = ± .20 to ± .40 denotes low correlation present but slight

r = ± .40 to ± .70 denotes significant relationship

r = ± .70 to ± 1.00 denotes high to very highly significant relationship

The most commonly used test for measuring significance of differences in mean scores is the analysis of variance. If significant "f" ratios are found for differences in achievement among the three size and cost groups the "t" test must be used to measure the significance of the difference between each of the three combinations of size and cost groups. If the "f" ratio is found to be non-significant the "t" tests will not be necessary. Partialing out intelligence and controlling the socio-economic background factors will be necessary to determine if the difference appear after these adjustments are made. The test to be used for this process is the analysis of co-variance. The point should be clarified here that the writer recognizes the fact that the "t" test and the analysis of variance and co-variance are sampling statistics which are being used to test differences between total populations. The reason for using these sampling techniques with total populations is for advisory purposes only and not as predictive measures.

The sign test as developed by Siegel[1] will also be used as a means of establishing levels of significant differences among the schools for the three basic factors of size-cost and achievement.

With this brief preview of the data gathered the investigation will next turn to an analysis of the various measures and informational data. Chapter IV will contain the analysis of the relationships among the various factors and Chapter V will present an analysis of the differences in achievement among the various groups.

---

[1] Sidney Siegel, Nonparametric Statistics for The Behavioral Sciences (New York: McGraw-Hill Book Company, Inc., 1956), p.68.

CHAPTER IV

ANALYSIS OF THE RELATIONSHIPS

With the raw data gathered and the design of the study outlined, the discussion will turn to an examination of the facts and information in an effort to answer the questions posed earlier. It is helpful to know that relationships and differences exist; it is also helpful to establish the levels of significance in these findings by statistical processes. The data for the investigations in Chapters IV and V were collected in part under conditions which satisfy the assumptions which underlie the various tests of significance including sampling. If the reader is willing to keep in mind these limitations in the interpretations of the tests of significance to follow, the tests may have some exploratory value. Attention will now be focused on this aspect of the study.

The basic questions under consideration will be restated and clarified here and the analysis of the data will be made with reference to these questions in Chapter IV. Chapter V will concentrate on the analysis of the data concerned with the three hypotheses.

Question 1: Are there significant relationships among the thirty-nine schools for the following factors of:

a. Size and cost.
b. Size and achievement.
c. Cost and achievement.

Question 2: Are there significant relationships among the thirty-nine schools for the following factors when they are grouped into three size categories, large N=9, medium N=14, and small N=16:

a. Size and cost.
b. Size and achievement.
c. Cost and achievement.

Question 1. Are there significant relationships among the thirty-nine schools for the factors of, (a) size and cost, (b) size and achievement and (c) cost and achievement? The correlation between size and cost for the thirty-nine schools is -.127. This is not a significant relationship. It is, however, a negative relationship and is in the direction of the inverse relationship which was spoken of so often in the literature; that is, the smaller the school the higher the per pupil costs. Henzlik and Chisholm were particularly emphatic on this point. It was also found that the correlation between size and achievement was +.110, which is also not considered significant using Garrett's criteria. When only the large and small schools are used in the correlation the relationship drops to +.014, which is even less significant than the same relationship for all the schools. These correlations are based on mean scores for the schools involved. When correlations on size and achievement were run for these schools which had a freshman class of which seventy-eight per cent or better had spent their entire life in the district (See Table II), the correlation remained negligible, being +.002. This amounts to no relationship at all. The third part of question 1 concerns the cost-achievement relationship. The correlation in this instance was +.150. This again is not a significant relationship when the thirty-nine schools are dealt with as one group. It is a positive relationship, however, and is the largest of the relationships reported thus far. Other measures such as Siegel's Sign test and the analysis of co-variance will be used to test for significant differences among the various schools with regard to the size-cost-achievement factors.

Question 2: Are there significant relationships among the thirty-nine schools for the size-cost-achievement factors when the schools are grouped into three size categories, large (over 800) N=9, medium (400-800) N=14, small (less than 400) N=16?

a, Size and cost.
b. Size and achievement.
c. Cost and achievement.

Using only the large and small schools and determining the correlation of the size and cost factors, it was found that the size-cost relationship was -.057, still a negative or inverse relationship although a negligible one. It will be recalled that the size-cost relationship for the thirty-nine schools as a group was -.127 (see page 68). In view of the consistency of this slight, but negative, relationship, it is fairly safe to state that the size of the reorganized districts bears a slight but consistent negative relationship to the cost per pupil for current operating expenses. This is consistent with the findings of most writers in the field of school finance who have studied this relationship.

TABLE II. Total Number of Students in Freshman Class, Number Used in the Study and Number of Farm Students in Each District and Per Cent Each is of Total in the Thirty-Nine Districts.

School Number	Number of Freshmen	Number Used in Study	Per Cent of Total Used in Study	Number Farm Students in Each School	Per Cent of Total from Farms	Per Cent of Permanent Group from Each School from Farms
1	210	112	.533	24	.114	.214
2	156	91	.583	12	.076	.131
3	128	98	.765	13	.101	.132
4	108	85	.787	41	.379	.482
6	84	43	.511	11	.130	.255
8	59	47	.796	17	.288	.361
9	60	30	.500	16	.266	.533
10	55	44	.800	3	.054	.068
11	60	52	.866	32	.533	.615
12	58	40	.689	16	.275	.400
13	56	41	.732	10	.178	.243
14	64	42	.656	19	.296	.452
15	66	56	.848	3	.045	.053
16	50	35	.700	14	.280	.400
17	46	26	.565	2	.043	.076
18	40	28	.700	10	.250	.357
19	44	35	.795	6	.136	.171
21	42	28	.666	9	.214	.321
22	30	25	.833	14	.466	.560
23	27	19	.703	3	.103	.157
24	36	24	.666	14	.388	.583
25	33	26	.787	1	.030	.038
27	35	32	.914	13	.371	.406
28	28	21	.750	15	.535	.714
29	27	17	.629	6	.222	.352

TABLE II (Continued)

School Number	Number of Freshmen	Number Used in Study	Per Cent of Total Used in Study	Number Farm Students in Each School	Per Cent of Total from Farms	Per Cent of Permanent Group from Each School from Farms
30	28	10	.357	9	.321	.900
31	23	11	.478	8	.347	.727
32	20	18	.900	7	.350	.388
33	29	27	.931	3	.103	.111
34	23	5	.217	3	.130	.600
35	37	22	.594	14	.378	.636
36	24	19	.791	13	.541	.684
37	28	26	.928	5	.178	.192
38	20	13	.650	3	.150	.230
39	17	16	.941	6	.352	.375
40	36	20	.555	11	.305	.550
41	30	19	.633	0	.000	.000
42	22	3	.136	0	.000	.000
43	7	6	.857	0	.000	.000
Totals	1946	1312	.674	406	.208	.309

Table III plainly shows that the large schools spent less per pupil ($229.66) over the five year period than either the medium ($241.00) or the small districts ($255.00). Thus there is an inverse relationship between size and costs when the schools are grouped and the mean scores of the groups are used for observing the cost and size factors. Whether the differences in costs are sufficient to produce noticeable differences in the schools is not known but the differences in per pupil costs between the largest school group which is the lowest cost group and the smallest school group which is the highest cost group is $26.00.

Table III. A Comparison of Size and Cost Factors in Large, Medium and Small Reorganized Districts of Wisconsin.

	Five year average cost per pupil for current operating expense (Elementary)	Five year average net elementary enrollment 1954-58	Total districts enrollment, high school and elementary 1958-59
Large schools N=9	$229.66	909	1367
Medium schools N=14	241.00	396	563
Small schools N=16	255.00	183	295

Turning next to a study of the size-achievement relationship it is found that among the large and small schools a negligible positive relationship exists, +.014. This is a very slight, in fact an almost complete lack of relationship. When all the schools were grouped by high, medium and low achievement it was found that for the high achieving schools there was a -.284, non-significant, negative relationship between size and achievement. For the medium achieving schools a negative -.088 relationship was found, and for the low achieving schools there was a +.828, highly significant, positive relationship. This striking contrast between the relationships of the size-achievement factors for high, medium and low achieving schools presents somewhat of an enigma. It appears that in the case of low achieving schools, where a highly significant positive relationship is shown between the two factors, we must conclude that some factor or combination of factors is causing this relationship to appear. It would be unwise, in view of the slightly negative relationship between size and achievement for the high and medium achieving schools to conclude that there exists a cause-effect relationship between the size and achievement factors in these schools. If there were a cause-effect relationship between size and achievement in all thirty-nine schools it ought to appear consistently when the schools are grouped according to high, medium or low achievement. This was not the case and further investigation is indicated.

The last relationship which will be considered before turning to the hypotheses to be tested, is that of the cost-achievement relationship. Using the scores of only large and small schools, the Pearson-Product Moment correlation produced a +.036 relationship which is not significant. This agrees well with the same relationship found for these two factors when run for the thirty-nine schools as a group +.150. Neither of these two correlations can be considered significant. When the schools were grouped by high, medium and low achievement, and correlations were run for the cost-achievement factors in all three groups, a negative relationship appeared. In the case of the high achieving schools the relationship was -.385 which is slightly significant, while for the medium achieving schools the relationship was -.403, which is significant. The low achieving schools showed only a -.013 relationship which has no significance. These facts seem to contradict the findings and statements of belief of many writers on school finance such as Mort and Reusser, who claim the existence of a high positive relationship between cost and achievement. This also contradicts the findings thus far of the longitudinal study being conducted by Dr. Kreitlow in Wisconsin. Figures 7, 8, 9, 10 show these correlations of the several factors in the schools when divided into size groups.

A close look at Table IV presents confusing data, for it is found here that the mean cost per pupil for the high achieving schools is $255.00, while that of the medium achieving schools is $263.00, and for the low achieving schools it is $232.00. These figures seem to contradict the negative correlations found within the three achievement levels and agree with Dr. Kreitlow's findings. These contradictions indicate the possible presence of other factors

Table IV. Summary Table of Size, Cost, Intelligence, and Achievement Factors for High, Medium and Low Achieving Schools.

HIGH ACHIEVING SCHOOLS; N=8

School	1 No. Students Scores Used	2 Achievement	3 Henmon-Nelson	4 Size	5 Cost
Ashland	91	66	48	1548	271.00
Almond	11	69	52	164	163.00
Melrose	24	67	49	319	238.00
Grantsburg	40	68	56	461	235.00
Taylor	19	67	45	220	244.00
Tripoli	16	65	47	198	285.00
Weyerheuser	10	66	46	191	354.00
Woodville	5	74	56	166	251.00
Total	216	542	399	3267	2041.00
Mean	27	67.75	49.875	408.4	255.00

LOW ACHIEVING SCHOOLS; N=8

School	1 No. Students Scores Used	2 Achievement	3 Henmon-Nelson	4 Size	5 Cost
Amberg	6	52	38	112	216.00
Bayfield	27	51	37	184	205.00
Hixton	21	55	40	268	230.00
Galesville	47	[illegible]	46	652	233.00
Holmen	42	55	40	416	217.00
Laona	26	56	42	423	233.00
Princeton	3	53	35	110	244.00
Rosholt	22	52	43	131	278.00
Total	194	430	321	2296	1856.00
Mean	24.25	53.75	40.125	287	232.00

TABLE IV. (Continued)

MEDIUM ACHIEVING SCHOOLS; N=12

School	1 No. Students Scores Used	2 Achievement	3 Hermon-Nelson	4 Size	5 Cost
Bruce	30	61	43	485	262.00
Drummond	20	59	43	172	345.00
Elcho	28	61	43	425	200.00
Frederic	41	59	43	402	220.00
Glidden	19	59	42	153	328.00
Goodman	26	60	45	180	259.00
Marion	52	59	42	559	309.00
Mellen	35	59	43	394	218.00
Shawano	112	59	45	1397	254.00
Threelakes	19	59	43	332	324.00
Wabeno	26	60	41	435	194.00
Wausaukee	32	60	42	328	245.00
Total	440	715	515	5262	3158.00
Mean	36.75	59.58	42.92	438.50	263.17

1. Only those student's scores were used who had spent their entire school career in the district in which they were tested.

2. These are the mean raw scores of the combined reading and mathematics tests discussed earlier.

3. Hermon-Nelson mean raw scores.

4. Five year average elementary enrollment, 1954-58.

5. Five year average cost per pupil in elementary schools for current operating expenses.

acting within the schools to bring about these correlations. These same unknown factors or a combination of them may also be causing a difference in the cost per pupil to appear. It is entirely possible, too, that the higher cost in the higher achieving schools may reflect the fact that the citizens of these communities are more concerned with having good schools. The Henmon-Nelson intelligence test scores of the high achieving schools reveal that the students in these schools score on the average about 10 points higher (49.875) than those in the low achieving schools (40.125). (See Table IV). This may indicate further that the citizens of the high achieving school districts as opposed to those of the low achieving districts, are brighter, may have higher incomes, higher educational training themselves and higher aspirations for their children. One must not deny also the possibility that low correlations found between cost and achievement as well as those in the other areas could be based on too small numbers to draw valid conclusions. More and different measures may be required to determine true relationships.

Another interesting fact appeared in the cost-achievement relationship study. When the schools are divided into two groups on the basis of the percentage of the freshman class who spent their entire school life in the district (called permanent students) striking differences were found in the cost-achievement relationship. In one group were placed those schools (15) in which a seventy-eight per cent or greater proportion of the freshmen had been in the district all nine years. In another group were placed all those schools (24) in which less than seventy-eight per cent of the freshman class had spent their entire school life in the district. The first group showed a correlation of +.555 between cost and achievement while the second group revealed a -.014 relationship. The +.555 relationship approaches the high correlation (+.60) spoken of by Woollatt, Mort and Reusser and others. It is possible that unless one has a group of schools which have more permanent student bodies the correlations between cost and achievement may be hidden or upset. This does not imply that the level of achievement is caused by the amount spent on the schools. There may be other forces acting with financial support or may accompany financial support which may be more important causes of the differences in achievement. A multiple correlation between size-cost and achievement in these schools produced a multiple R or .602, which is remarkably close to the .60 found by Woollatt and others. The same correlation for the schools with less than sixty per cent permanent students in the freshman class produced a +.02 correlation. This is not significant, but it is a striking contrast to the +.555 correlation found between cost and achievement alone and the multiple R of .602 in the districts with seventy-eight per cent or more permanent students in the freshman class.

Summary of the Relationships

This completes the review of the relationships as stated in question 1 and 2. It has been found that: (1) The size and cost relationship is a small, but consistently negative one. (2) The size and achievement relationship is neither significant nor consistent and bears further investigation. (3) The cost-achievement relationship is neither consistent or significant for the total group. (4) The cost-achievement relationship is significant when the schools are grouped on the basis for premanency or non-permanency of the freshman class. This aspect bears further consideration and research.

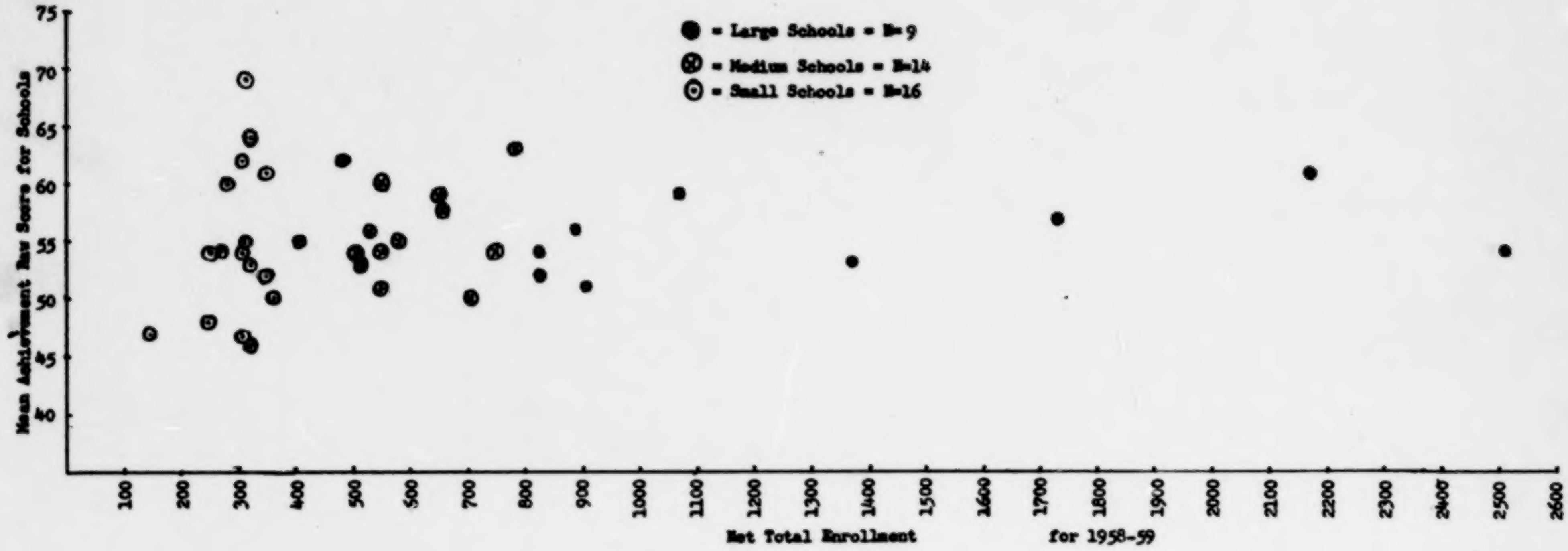


Figure 7. Correlations of Size and Achievement for Large, Medium and Small Reorganized Districts.
(r = .110)

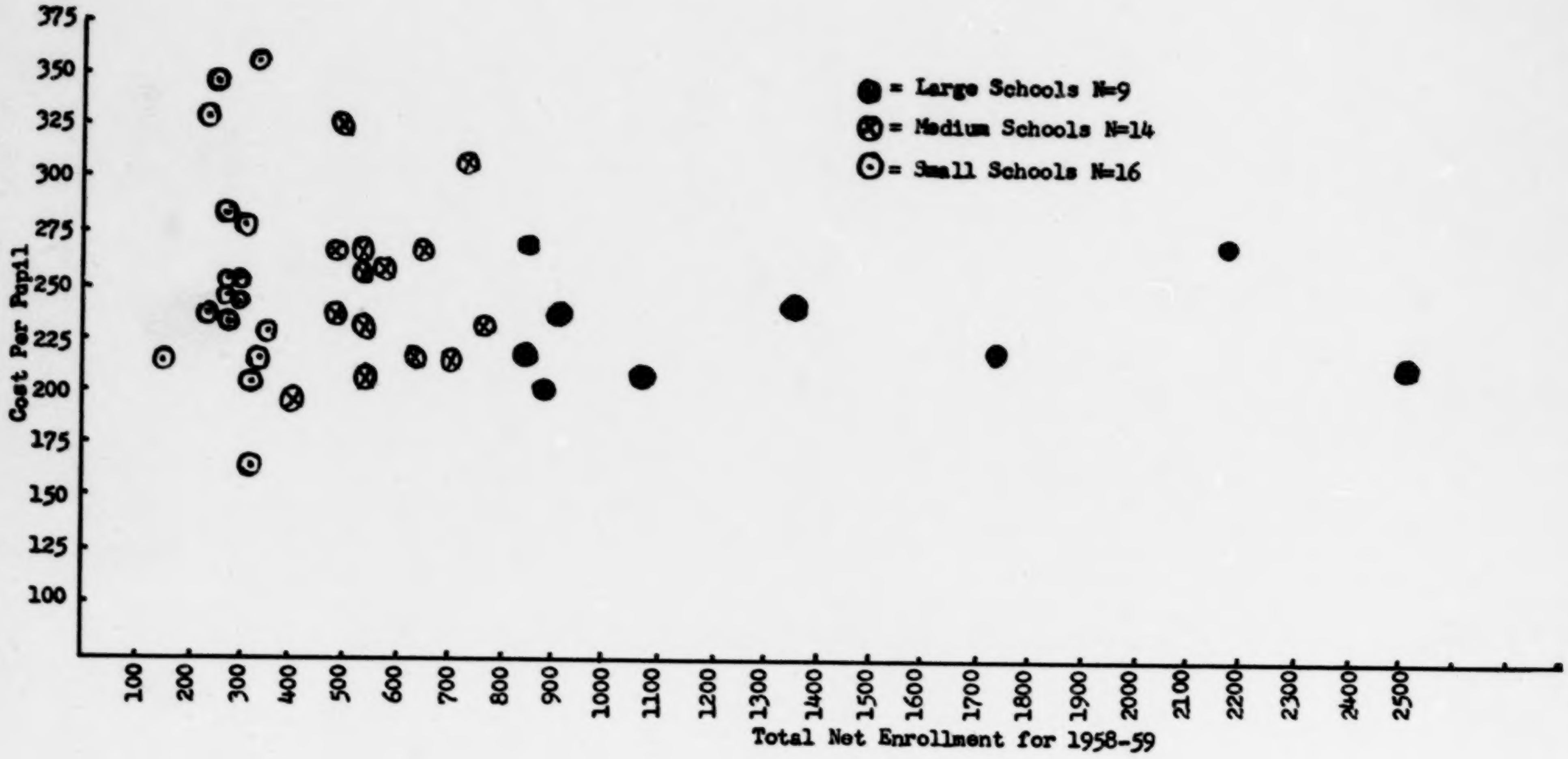


Figure 8. Correlation of Cost and Size for Three Size Groups: Large, Medium and Small.
(r = -.127)

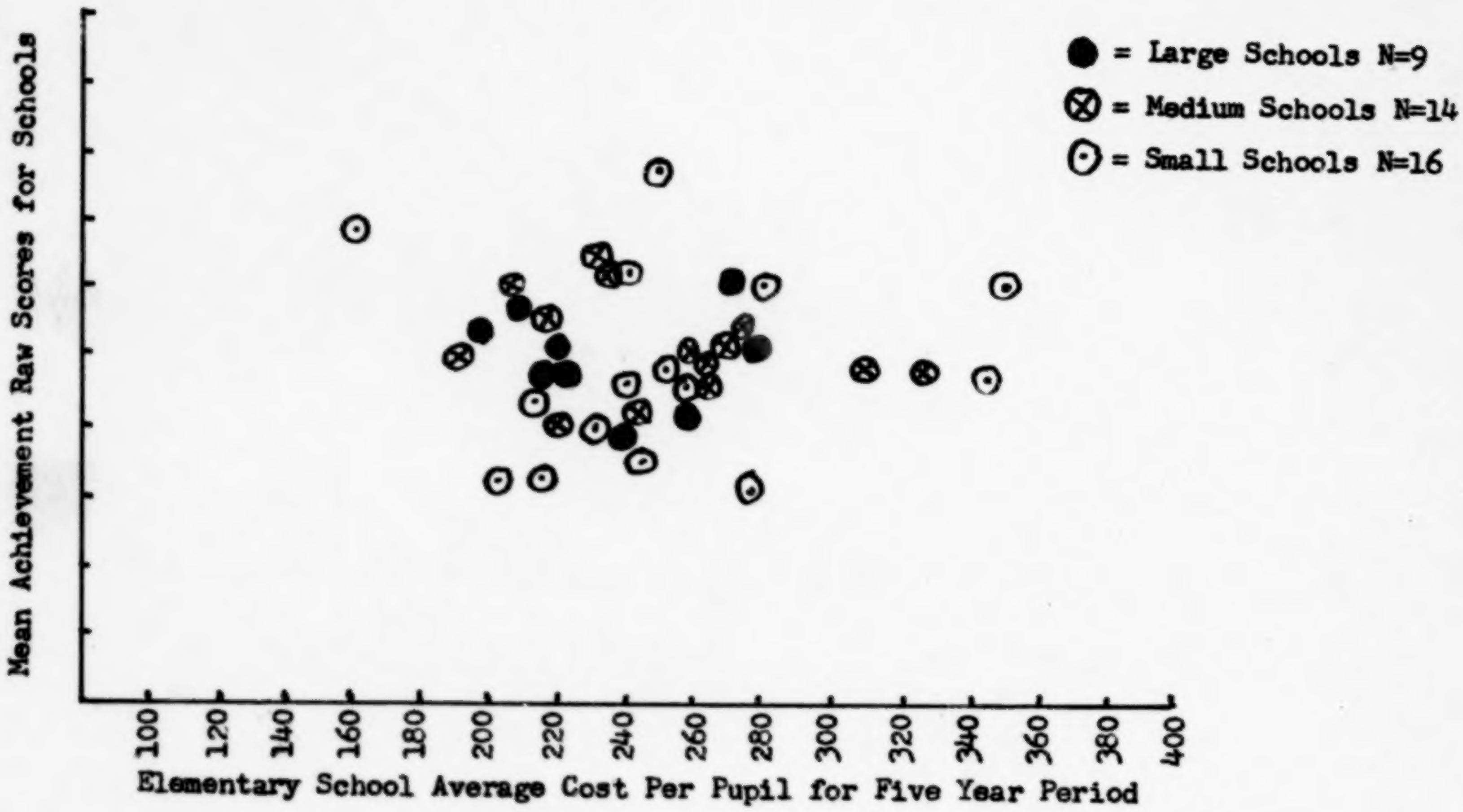


Figure 9. Correlation of Cost and Achievement for Large, Medium, and Small Reorganized Districts. (r = .150)

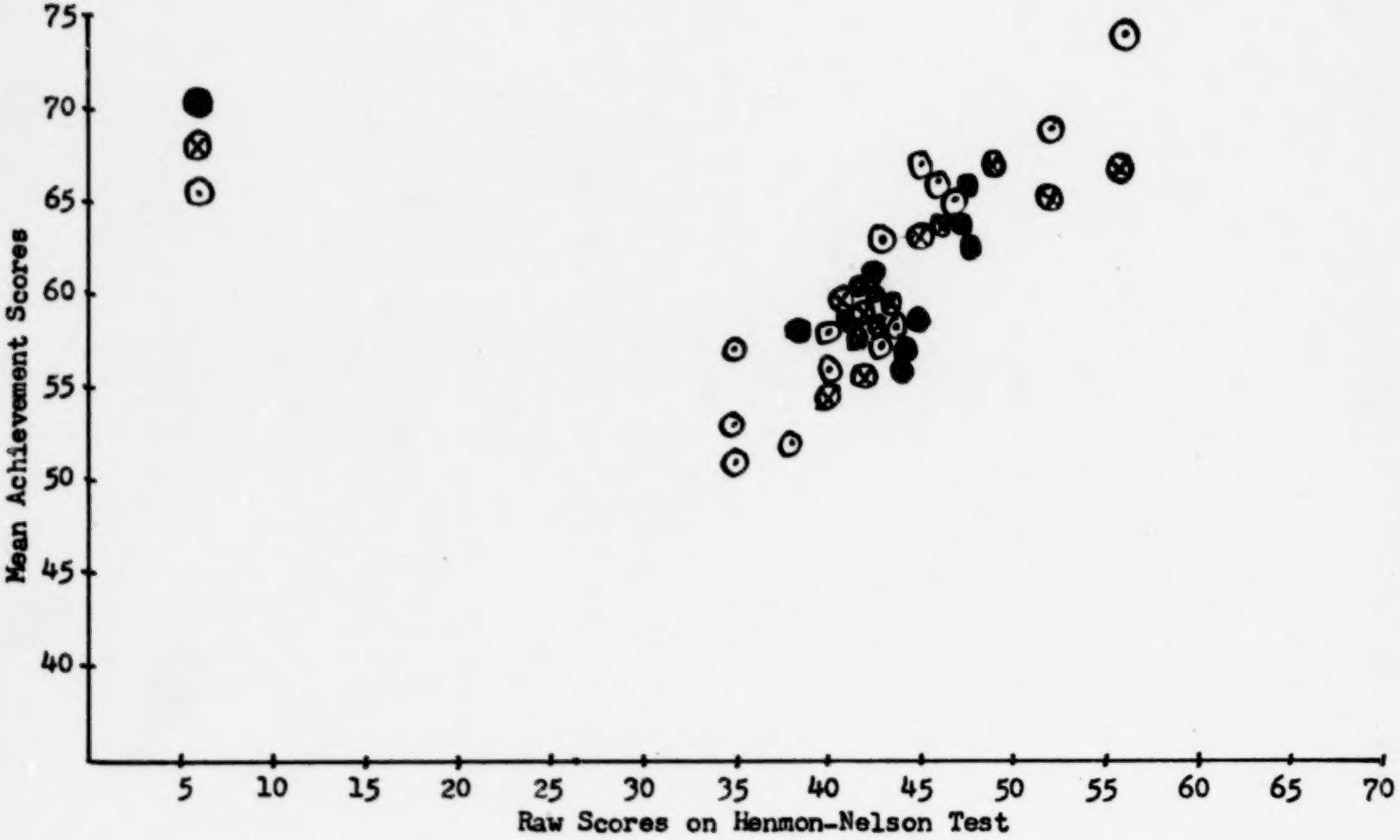


Figure 10. Correlation of Mean Achievement Scores and Henmon-Nelson Raw Scores in Large, Medium and Small Reorganized Districts of Wisconsin. (r = .82)

CHAPTER V

ANALYSIS OF THE DIFFERENCES IN THE SIZE-COST AND ACHIEVEMENT FACTORS

The analysis will now turn to an examination of the data necessary to either accept or reject the three null hypotheses. Before the proper statistical tests can be accomplished it is advisable to show that the factors of intelligence and achievement are normally distributed to establish the fact that we are dealing with a normal population. The Chi-square test for goodness of fit is the normally accepted test for this assumption. Figures 11, 12 and 13 give strong indication by observation of the curves that these factors are normally distributed and that our population is a normal one. The Chi-square test for goodness of fit produced a Chi-square ratio of 9.227. Entering the Chi-square table with 5 (N-3) degrees of freedom, the level of significance reached is between .20 and .10 which is not significant and shows that Henmon-Nelson scores are normally distributed. Since the achievement test scores and Henmon-Nelson scores are correlated at .82 with each other, (See Fig. 10) it can be safely assumed that the distributions are reasonably similar and a Chi-square test would not be necessary to prove the normality of distribution for achievement scores.

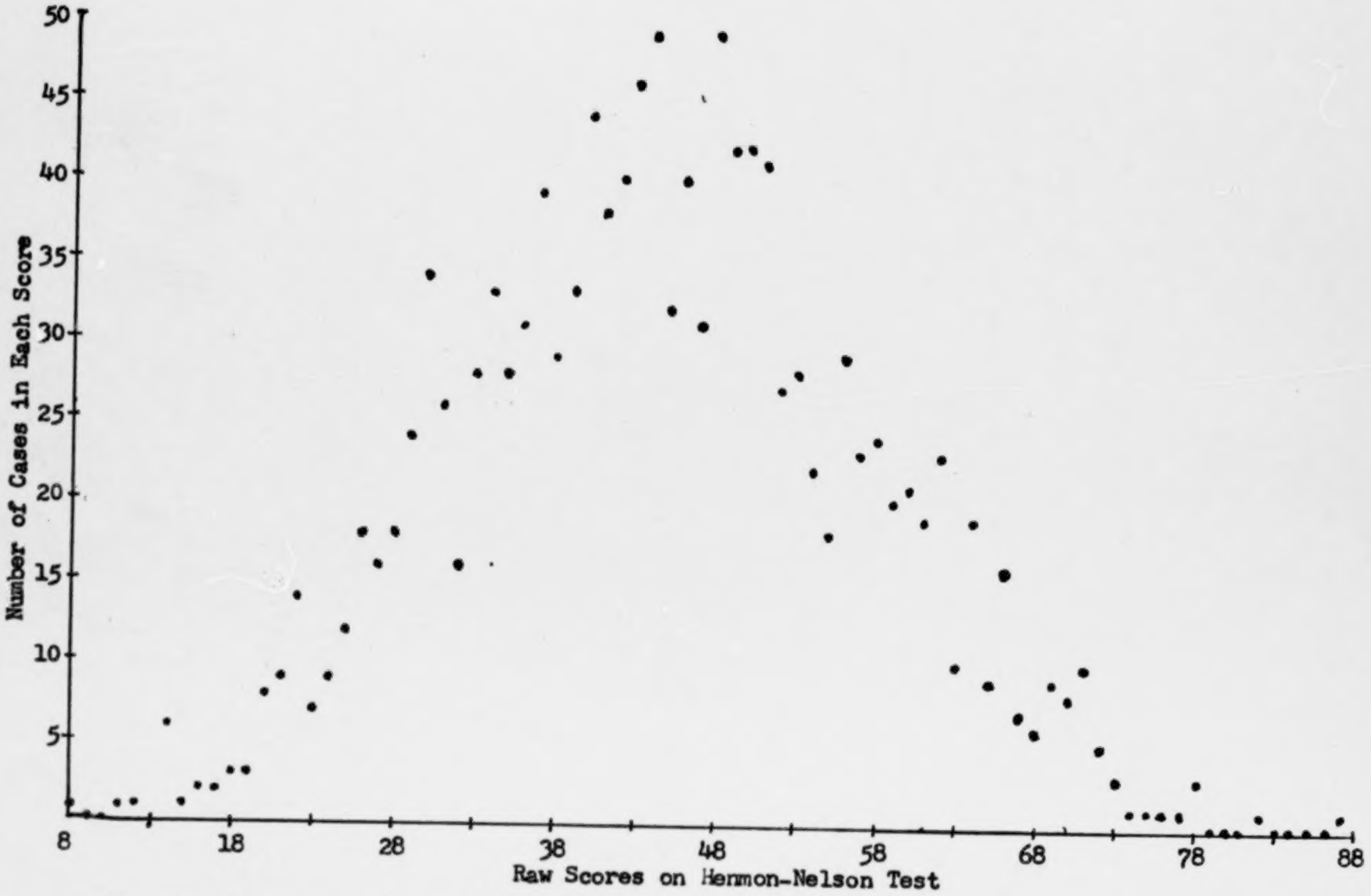


Figure 11. Distribution of Individual Henmon-Nelson Raw Scores for Thirty-Nine Schools.

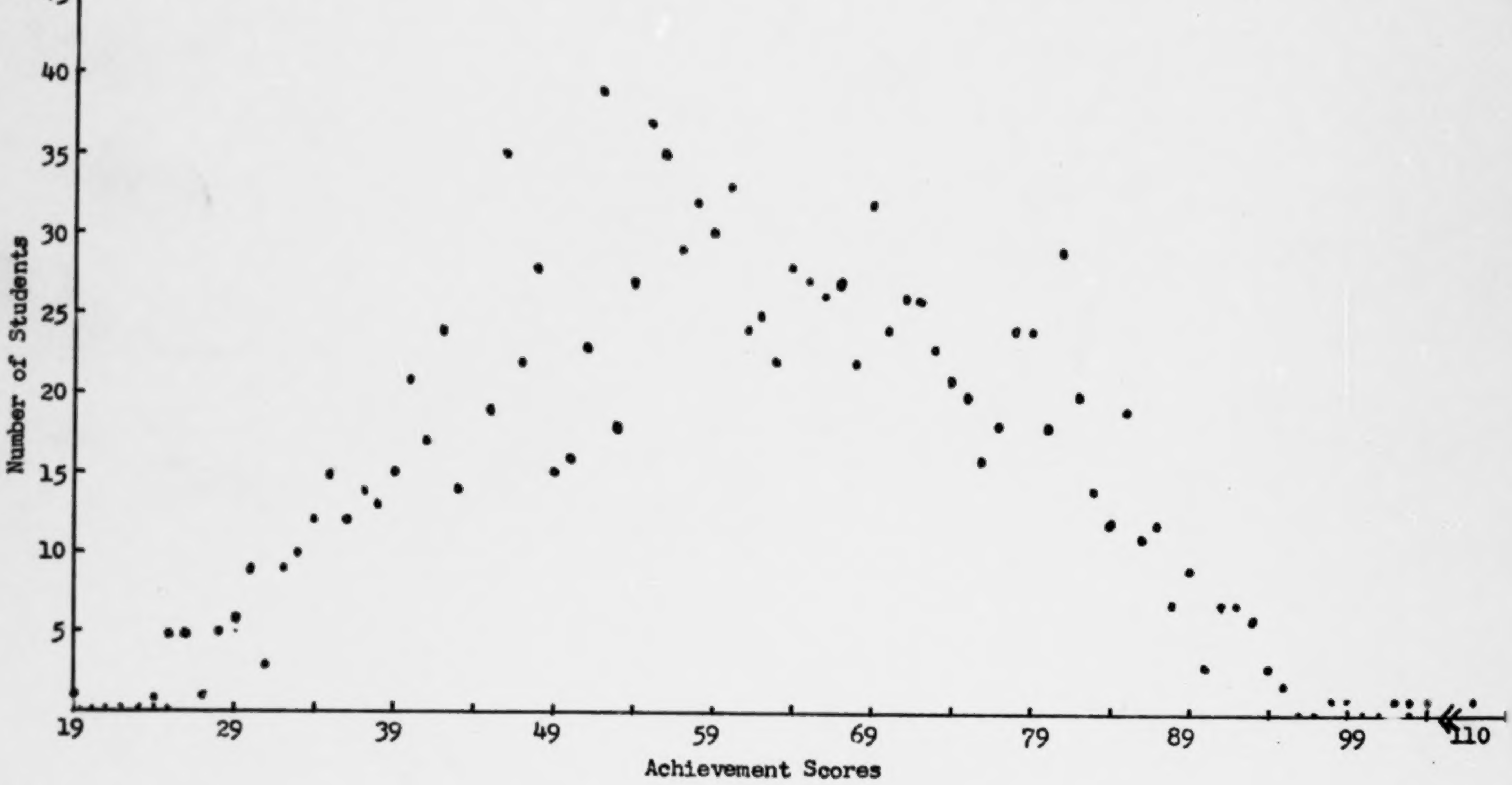


Figure 12. Distribution of Individual Achievement Scores for Thirty-Nine Schools.

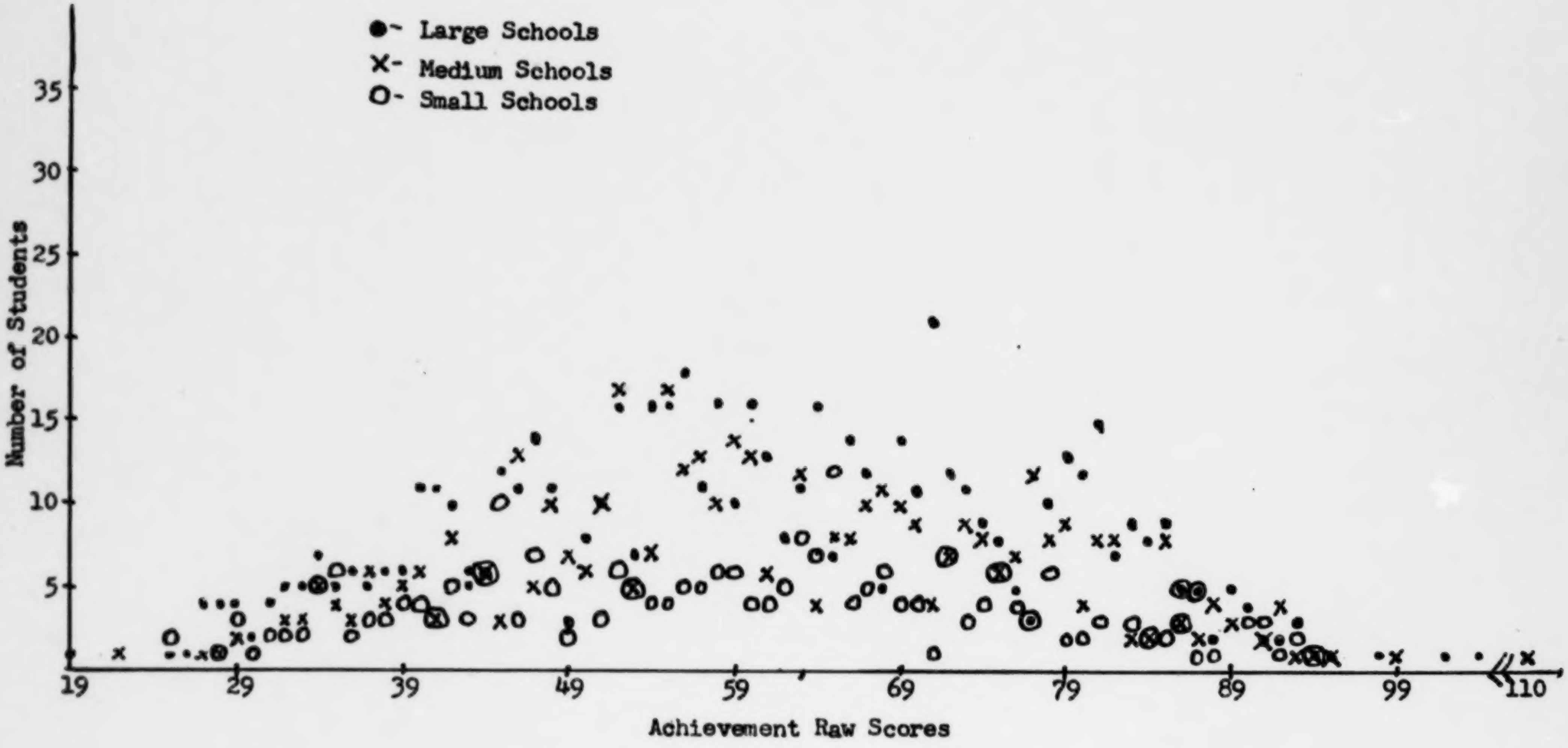


Figure 13. Distribution of Individual Achievement Scores for Large, Medium and Small Schools.

Further Chi-Square tests were made for the intelligence factor on the three size groups of schools, large, medium and small, and in each case the level of significance did not reach the .05 level. These levels were: large = .10, medium = .30, small = .10. Here again one may safely assume goodness of fit for achievement score distribution among the three size groups for the same reasons given above. Inspection of the curves also verifies this conclusion.

Being reasonably assured that the students' achievement and intelligence scores represent a normal population distribution curve, we are ready to turn to the first hypothesis.

Hypothesis 1: There are no significant differences in achievement scores among students in the three sized school districts, large, medium and small.

One of the recognized tests for reaching a conclusion on this type hypothesis is the analysis of variance. The analysis of variance test revealed an "f" ratio of 1.40 which was not significant. From this fact and the small differences between the mean scores of the three sized groups we conclude therefore, that the differences in mean achievement scores among the three size groups is not significant, and that hypothesis 1 must be accepted. A summary of the analysis is found in Table V.

TABLE V. Analysis of Variance for Achievement Among Large, Medium and Small Schools.

	Sum of Squares	d.f.	Mean Squares	f ratio	
Means	734	2	367	1.40	NS*
Within	343,028	1309	262		
Total	343,762	1311			

*Not significant at .05 level.

There appears to be a difference in mean achievement scores between the medium and small schools in favor of the medium sized schools. However, by inspection of Table VI it can be seen that the mean score on the Henmon-Nelson intelligence test is almost two points higher for the medium sized schools than for the small schools, being 44.923 and 43.098 respectively. This means in all probability that this difference in mean achievement scores in favor of the medium sized schools and large schools would disappear when the effect of differences in mean intelligence scores is partialled out through analysis of co-variance, or when the students are chosen from similar socio-economic background as shown by the paternal occupations.

The sign test was applied to the data in Table I. The sign test is based on the signs of the differences of paired observations. The null hypothesis that the differences are essentially equal can be rejected when it is shown that the numbers of positive and negative signs differ significantly. With eight observations and three negative signs there is no significant difference in the achievement scores of the large and small schools.[1] The same test for the achievement difference between the medium and large schools reached the .10 level of significance in favor of the medium sized schools; and for the medium and small schools the .25 level was reached in favor of the medium sized schools.

TABLE VI. Mean Achievement and Henmon-Nelson Intelligence Scores in Large, Medium and Small Schools.

Size of School	Mean Achievement Scores	Mean Henmon-Nelson Scores
Large Schools	60.498	45.172
Medium Sized Schools	61.041	44.923
Small Schools	58.940	43.098

Hypothesis 2: There are no significant differences in mean achievement scores among farm students in the three sized schools when the effect of intelligence is partialled out.

Figure 14 gives the type and number of occupations represented among the students in this study. It shows that the largest single occupational group are the farmers with a total of 406. The large schools had 169, medium 134, and small 103 students whose fathers were engaged in farming. It is believed that, while there are individual differences among farmers themselves as among any other occupational group, using only students from farm backgrounds would give a more homogeneous group to study the effect of size and cost on the dependent variable, achievement. The students from farms were chosen for this test because they formed the largest single group and seem to be most representative of the population in this study. Reorganization in Wisconsin is largely a rural problem. In order to make equal n's in the three size groups, 100 farm students were chosen at random from the large and medium sized schools and 100 were chosen from the small schools making a total of 300 farm students to be used for testing this particular hypothesis.

---

[1] Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences, (New York: McGraw-Hill Book Company, Inc., 1956), p. 68.

TABLE VII. Mean Intelligence and Achievement Scores for all Students and for Farm Students in Large, Medium and Small Reorganized Districts.

Size of Schools	Henmon-Nelson Scores All Students	 Farm Students	Achievement Scores All Students	 Farm Students
Large	45.172	42.20	60.498	57.59
Medium	44.923	45.74	61.041	63.09
Small	43.098	44.36	58.940	60.96
Total Mean	44.397	44.00	60.156	60.546

Table VII is a summary of the mean scores in achievement and Henmon-Nelson intelligence scores for the 300 farm students and for all students by size of school districts. These data clearly show that the farm students in the medium and small districts scored

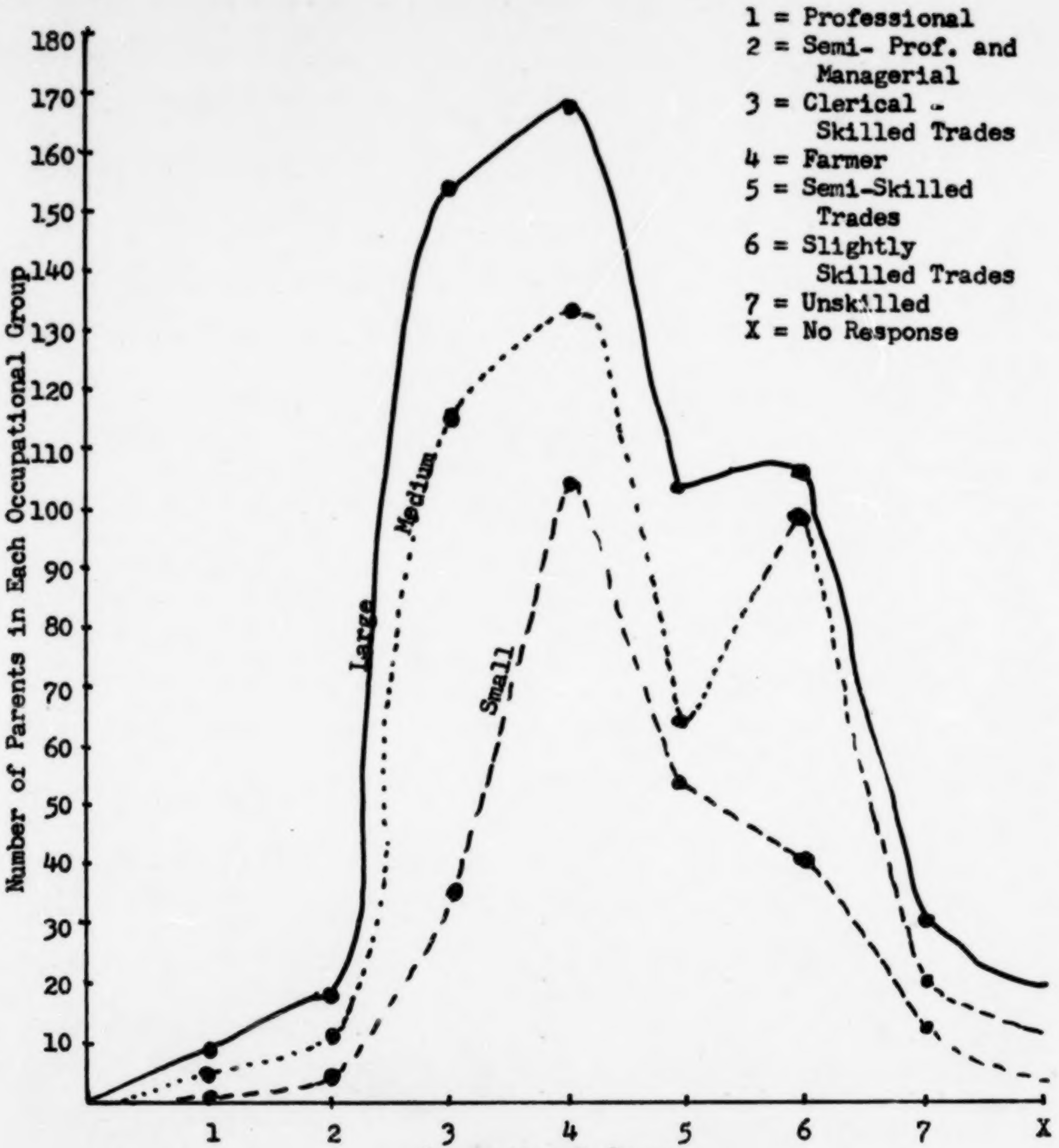


Figure 14. Paternal Occupational Ratings in Large, Medium and Small Reorganized Districts.

higher both in the achievement tests 63.09 and 60.96 respectively and on the intelligence tests 45.74 and 44.36 respectively than either the farm students in the large districts or the non-farm students in their own districts. The farm students of the medium sized districts scored 3.5 points higher on the Henmon-Nelson tests than the farm students in the large districts. A look at the achievement scores reveals that the farm students from the medium-sized districts scored 5.5 points higher on the STEP tests than did the farm students in the large districts, thus the farm students from the medium sized districts appear to be intellectually superior to the farm students from the large districts. It is interesting to note that the farm students scored slightly below the average on the Henmon-Nelson test and slightly above average on the achievement tests. Before proceeding with the test of analysis of co-variance to determine whether these differences are significant, tests of correlation were run between the factors of achievement and intelligence among the three groups and the following correlations were found: Large Schools $r_{ai} = +.73$, Medium Schools $r_{ai} = +.87$, Small Schools $r_{ai} = +.75$.

These are all highly significant, and with the other evidence of a normal population we may assume homogeniety of regression between the two factors for the three groups. The calculations for these Pearson-Product Moment Correlations may be found in Appendix "G".

The correlation for these same factors for the total group of students was found to be +.82 (See Fig. 9). There seems to be a consistently high correlation between these two factors as shown by the tests administered which may give indication of the homogeniety of the population.

The test of analysis of co-variance showed no significant difference in mean scores for farm students from large, medium and small districts. The summary of that test is shown in Table VIII.

TABLE VIII. Analysis of Residuals.

Sources	Residuals	df	Mean Square	F	
Variance among Schools	292	2	146		
Variance within Schools	30,374	296	143	1.417	NS*
Total Variance	30,666	298			

*NS = Not significant at .05 level.

The calculations from which these results were derived are found in Appendix "H". We conclude then, from this analysis and by observation of the mean scores in Table VII that the second hypothesis must be accepted and no further tests will be required on this issue, i.e. that farm students achieve about as well in the three size reorganized districts of Wisconsin. An "f" ratio of 1.417 is not significant at the .05 per cent level.

Hypothesis 3: There are no significant differences in mean achievement scores among farm students in the 39 schools when the students are grouped into schools of high, medium and low cost per pupil for current operating expenses and where intelligence is partialled out through the analysis of co-variance test.

In other words the question is being asked, does the amount of money spent per pupil make a difference in pupil achievement when we control socio-economic background and partial out the effect of unequal intelligence scores? It was found earlier that the correlations between cost and achievement were not significant or consistent, a fact which led to the conclusion that these relationships required closer study. It was concluded that by dividing the schools from which the farm students came into three cost groups on the basis of the amount spent per pupil for current operating expenses over a five year period a method could be devised for evaluating the effect of cost on achievement. Table IX shows how these schools and farm students were placed in high, medium and low cost schools. Using the data found in Table I, page 23, the thirteen schools with the highest mean cost were placed in the high cost group. The next eleven highest cost schools were placed in the second or medium cost group, and the lowest twelve were placed in the lowest cost category. The mean cost for the thirteen highest schools was

TABLE IX. Division of Reorganized Districts into High, Medium and Low Cost Schools.

High Cost Schools N=13		Medium Cost Schools N=11		Low Cost Schools N=12	
Mean Cost per Pupil		Mean Cost per Pupil		Mean Cost per Pupil	
$354.		$253.		$220.	
345.		251.		220.	
324.		245.		218.	
309.		244.		217.	
285.		242.		216.	
278.		238.		213.	
271.		236.		209.	
267.		235.		207.	
262.		233.		205.	
260.		233.		200.	
259.		230.		194.	
254.				163.	
254.					
Total of Means	$3722.00	Total	$2640.	Total	$2482.00
Means of Means	286.30	Mean	240.	Mean	206.83

$286.30 per pupil. The medium cost schools had a mean cost of $240.00, while the lowest twelve had a mean per pupil cost of $206.83. It will be noticed that these three groups contain only thirty-six of the thirty-nine schools in the study. The reason for the absence of three of the schools is that these schools had no farm students among those being used in the study. It is significant to note that there is slightly less than an eighty dollar difference in average per pupil costs between the high cost group and the low cost group. Any cost difference effect may have been lost in various ways such as differences in price indices in the various communities and the effect of the inflationary period. Thus the costs are so nearly the same that one would hardly expect to find differences in achievement. If the cost had varied from $200. to $600. among the different groups perhaps measureable and significant effects would be discovered. Research and experimentation in this area seems to be warranted. The same can be said for the difference in cost between the large, medium and small schools where there was only a difference of twenty-six dollars between costs per pupil in the large schools and those of the small schools.

Having grouped the farm students into high, medium and low cost schools on the basis of the per pupil costs over the five year period, 1954-58, hypothesis 3 was tested by the analysis of co-variance technique. The data on which this analysis was made is presented in Table X.

TABLE X. Summary Data on Size-Cost-Achievement and Intelligence Factors among all Farm Students in High, Medium and Low Cost Reorganized Districts N=300.

	Mean Cost per Pupil	Mean Achievement Scores	Mean Henmon-Nelson Scores	Mean 5 Year Enrollment	IA[1]
High Cost	$286.30	58.37	41.54	448	.803
Medium Cost	240.00	61.46	44.69	367	.792
Low Cost	206.83	59.68	43.10	549	.846

[1] IA = Correlation between Intelligence (Henmon-Nelson) scores and achievement scores.

The calculations performed in making the analysis of co-variance are presented in Appendix "I".

It can be plainly seen in Table X that the low cost schools achieved more than the high cost schools and that the medium cost schools achieved higher than either the high or low cost schools. Creating an even more confusing picture is the fact that the medium cost schools are the smallest of the three groups in average enrollment. The only factor among these presented here agreeing with the differences in achievement is the intelligence scores of the students.

The analysis of co-variance made on the three groups of farm students based on the schools costs and the observations of the mean achievement and Henmon-Nelson score similarities suggest that the differences in achievement are not significant. We conclude therefore, that hypothesis 3 must be accepted. Table XI presents the summary of these calculations.

TABLE XI. Analysis of Residuals for the Analysis of Co-Variance Between Achievement and Intelligence for Farm Students from High, Medium and Low Cost Schools.

Source	Residuals	d.f.	Mean Square	f
Among Means	1.04	1		
Between Regression	8.96	1		
Among Schools	10.00	2	5.00	.049 NS
Within Schools	29613	296	100.04	
Total	29623	298		

An "f" ratio of .049 does not approach significance at the .05 level, so it can safely be assumed from this evidence and the other observed data that any differences in achievement among farm students from high, medium and low cost schools are due to the intelligence factor or other factors, but not the cost per pupil.

On the theory that the type of elementary school attended by these farm students might have influenced their achievement in reading and mathematics, the data on the type of elementary school attended were collected and the results are presented in Table XII.

TABLE XII. Per Cent of Time Spent by Farm Students in Three Types of Elementary Schools in the Reorganized Districts of Wisconsin, 1950-59, and for all Farm Students by High, Medium and Low Cost Schools.

	One Room Schools	Two or Three Room Schools and No Responses*	Multiple Room Schools
High Cost Schools	32%	5%	63%
Medium Cost Schools	32.7%	13.6%	53.7%
Low Cost Schools	44.0%	3.0%	53%
Total for All Schools	37.56%	6.63%	55.81%

*Some students did not respond to questions 1 and 2 on the questionnaire (See Appendix "E") or they accounted for only part of their elementary school attendance.

Table XII reveals that the farm students in the reorganized districts spent over one-third of their elementary school years in one-room schools. Aside from the effect this might have had on the achievement of the students, the fact that the farm students in reorganized districts have spent at least one-third of their elementary school years in one-room schools indicates that this type of school has not disappeared in many reorganized districts. Calculations were made of mean achievement scores for farm students who attended one-room schools and those who attended multi-room elementary schools. There was no difference in the achievement of the two groups.

Summary of the Differences

The three null hypotheses which were stated in the beginning of this chapter have now been answered. The results of the statistical analysis provide the following answers:

Hypothesis 1:

> There are no significant differences in achievement among the students in large, medium and small schools. This hypothesis was accepted.

Hypothesis 2:

> There are no significant differences in achievement for farm students in large, medium and small schools when intelligence is partialled out. This hypothesis too, was accepted.

Hypothesis 3:

> There are no significant differences in achievement for farm students from high, medium and low cost schools when intelligence is partialled out. Hypothesis three was also accepted.

Since the correlation between cost and achievement showed significant change when only the schools were used which had a (78 per cent) proportion of permanent freshmen it was logical to determine if the achievement varied among these schools when they were divided into high and low cost groups. This was done as shown in Table XIII. The mean of mean costs for high and low groups revealed that the higher cost group spent thirty-seven dollars more per pupil than the lower cost group. It is shown that the achievement difference of four and seven-tenths points is also in favor of the high cost group. Using Siegel's sign test on the achievement scores of the high and low cost schools the level of significance of .01 was reached. Thus there appears to be a significant difference in achievement in favor of the high cost schools. A look at the mean of mean intelligence scores reveals, however, that almost the same difference appears in favor of the high cost schools being four and two-tenths points. An analysis of co-variance would probably reveal no real differences between the achievement of the two groups when the effect of differences between mean intelligence scores was partialled out. We conclude therefore that the differences in achievement are due to factors other than costs or to a combination of unknown factors and costs.

TABLE XIII. Comparison of Achievement and Costs in High and Low Cost Schools with Seventy-Eight Per Cent of More Permanent* Students in the Freshman Class.

Total N=15

High Cost Schools N=8				Low Cost Schools N=7			
Costs	Achievement	MSMORS**	H.N.	Costs	Achievement	MSMORS**	H.N.
$285	65	4.437	47	$242	58	4.317	39
267	63	4.803	45	233	56	4.500	46
260	58	4.080	44	233	56	4.833	42
254	59	4.714	43	220	59	4.115	42
254	57	4.731	46	216	52	5.166	38
253	58	5.055	45	205	51	4.958	37
245	60	4.760	45	194	60	4.562	42
244	67	3.840	45				
$2062	487		360	$1543	393		286
***$257.75	60.87		45.00	$ 220	56.14		40.8

* Permanent means that the student had spent his entire school life in the district.

** MSMORS = Mean Score on Minnesota Occupational Rating Scale.

*** Means of means.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

It must be borne in mind when forming conclusions from this study that only the results of the elementary schools in the reorganized districts are being examined here, and these results are only a part of the total curriculum of these schools. We must also reiterate the fact that achievement in the subject matter fields is not the only objective of the elementary school.

In chapter three, when discussing the design of the study, the main objectives of the study were to find out what relationship and differences existed for the factors of size and cost and achievement, and to suggest ways to interpret these findings. We have reached the first objective and must now turn to the interpretations, conclusions and recommendations.

It was found that the schools varied quite significantly in size, cost and achievement. The sizes ranged from 141 students in the smallest district to 2511 in the largest district. The costs ranged from $163.00 per pupil in the lowest cost school to $354.00 in the highest cost school. This study, however, concentrated on the three size groups in which the mean cost per pupil varied only \$26.00 between the large and small groups. Achievement renged from a mean raw score of fifty-one in the lowest achieving school to seventy-four in the highest achieving school. These differences are no doubt real and significant, but the relationships and interaction of the three factors remain somewhat puzzling.

The Size Factor

In order to examine these factors and their relationships each will be discussed individually and in conjunction with the other two. The first factor, that of size, is based on elementary and high school enrollment for the 1958-59 school year. By most standards, as identified in the literature, the sixteen small districts in this study seem small for efficient and effective educational progress. The medium and large districts seem large enough in most cases to offer a well rounded program, but even here many of the high schools do not have one hundred students in their graduating classes as is currently being recommended by Dr. Conant. In view of the fact that no significant relationships or differences were found in achievement between the various sized groups it is possible that size of the district is not related to achievement in these basic subjects in the reorganized districts of Wisconsin. It is conceiveable also that the larger districts which might have an organizational advantage over the smaller districts are not making use of this fact to produce greater achievement in the two areas of reading and mathematics. It seems reasonable to assume that the smaller schools may give proportionately more time and effort to the teaching of the so-called fundamentals and subject matter, while the larger schools may be emphasizing the child-centered approach and placing less emphasis on the kind of subject matter measured here. Further research might lead to acceptance or rejection of this conjecture.

The disclosure that many of the farm students in these schools spent their elementary school careers in one-room schools reveals that some of the reorganized districts are not fully reorganized in the commonly accepted sense of the word. According to the proponents of reorganization when farm children are brought into larger attendance units where provision for individual differences can be more easily achieved, and where more effective use can be made of instructional equipment and building facilities, it is logical to assume that pupil achievement will improve. In view of the small size of many of these reorganized districts it is questionable whether some of these districts can accomplish the broad aims of reorganization. References will be made to findings on this aspect later in this chapter.

The Cost Factor

The cost factor is the second factor with which this study was concerned. Attention was primarily focused on the expenses for current operation on the theory that these costs most directly affect the instructional program. A broader study of the relationship of several cost factors to the achievement factor in which costs were divided into smaller items using a factorial analysis design might provide pertinent and useful results.

Higher costs in the schools in this study were not related to achievement. This should not be interpreted to mean that higher costs, if properly used may never cause higher achievement. If higher salaries are used to hire better teachers who are paid on the basis of their accomplishments in the classroom it is conceivable that higher costs might bring about increased pupil achievement. Although the teachers in the schools of this study were not considered they should be included in any future comparisons of schools in which achievement is to be examined. Obviously the teacher plays a key role in determining the level of achievement of the students. A study probably should be made to determine what effect money, per se, has on securing better teaching. The question frankly stated is this: Will higher salaries improve teacher performance in the classroom? If so, what are the optimum salaries needed to give the desired results? In order to determine the answer to these questions an experiment might be designed in which closely matched teachers in similar situations were studied for effectiveness before and after increases in salary were made. The results of business research in this regard would lead one to believe that money alone is not enough to increase worker productivity. It appears that certain intangibles such as personal relations, working conditions and management's concern for the workers are highly related to production. Two related research areas could be explored which would determine the influence management or administrative leadership has on teacher effectiveness and to what extent higher pay for administrators affect the quality of administrative actions and the effect of these actions on teacher performance.

The highest cost school in this study as we have seen, had a per pupil cost of $354.00 and the lowest $163.00. This represents a real difference in yearly costs per pupil, but whether or not these differences are great enough to affect appreciable differences in pupil growth is not known. Furthermore, as has been pointed out previously, the difference in the mean yearly cost per pupil between the three size groups was just about twenty-six dollars. It is very doubtful that this difference is significant. The disclosure that there was no significant relationship between cost and achievement may be a source of concern. It is possible that the cost differences are not great enough to affect achievement, for these are inflationary times when a dollar does not buy what it did ten or fifteen years ago, making it conceivable that larger differences in costs may be necessary before any measurable effects are found. There is also the problem of the time lag between the period when the money is spent and when the effect of those expenditures is really felt. It is possible that the schools are not using the extra costs to the best advantage in procuring better classroom instruction. Some exploration into this area might also be useful. Most administrators believe that higher salaries can secure better teachers, but it is not an inevitable consequence, and it would not occur as quickly as single or less complex cause-effect relationships. The crux of the matter is that the ability to inspire young minds to greater achievement and intellectual growth deserves more attention. Perhaps greater financial reward for high performance in this area will pay dividends in greater pupil achievement. A well planned research project on the effects of varying costs on school achievement appears to have some possibilities.

The Achievement Factor

The final phase of this study will focus on a discussion of achievement. This factor has already received some attention in the examinations of the size and cost factors, but needs a more complete analysis to place it in proper perspective. In previous references to achievement no clarification has been made of the criteria by which achievement should be judged superior, average or poor. Only differences among schools have been noted and comparisons made of these differences. One of the reasons for this procedure is that the precise level of achievement which a school should reach, or which a student should attain for any area of subject matter is most difficult to prescribe. In the present evaluation it is believed that the important fact is the relative positions of schools with respect to differing size, cost and achievement factors.

The question of the proper emphasis to be placed on academic achievement in the elementary schools is a crucial one to be decided by trained professional leaders with the assistance of informed citizens, and should be answered before an evaluation of the schools on their performance in this regard can be made. It is conceivable that school "A" might rate very high in producing achievement results, but at the same time may be neglecting other aspects of the school program. The opposite situation may prevail in school "B", where achievement is neglected for other educational objectives. The activities of the school in most instances need a periodic realignment with its broad aims and objectives. This type of evaluation is going on constantly at the local level but the quality of the evaluation will vary with communities depending on the intellectual and educational levels of the citizens and their interest in education.

Although achievement tests are valuable and necessary aids in evaluating or rating these schools certain limitations must be observed in interpreting the results. To accept greater achievement in school "A" as prima facie evidence of its superiority over school "B" may lead to wrong conclusions. The lower achieving school may have children of lower intelligence and homes with lower socio-economic status and lower levels of educational aspiration. In other words it may require greater effort to produce the same results in school "B" as in school "A". All the above mentioned socio-economic, intellectual and cultural factors must be known and accounted for before one can say definitely which school is actually operating most effectively. Sometimes an ethnic factor may enter the picture further confusing the issue. An effort was made in this study to control or partial out the effect of differing home backgrounds and differing levels of intelligence, but these may not be sufficient to convey a true picture of the total situation.

The problem of deciding which conditions and combinations of size and cost will produce optimum growth in achievement is a complicated one, the answers to which perhaps lie in more intense and perhaps prolonged research. This research if conducted within carefully chosen schools under even more rigidly controlled experimental conditions, using size and cost as the independent variables, may lead to some of the answers. Such research is recommended for the reorganized districts of Wisconsin.

A further study should be made using the same students used in this study to determine the effect of size and cost at the high school level. These students, who were freshmen in 1959, will be seniors in the 1961-62 school year. If they are measured in the same fields of achievement and the size-cost data gathered on their respective schools, significant differences might be found among them.

A final word on the achievement of the students in this study should be added concerning those who attended one-room schools and those attending multiple room schools. It was found that the students who attended the one-room schools did as well in reading and mathematics as their classmates who attended the multiple room schools. If there is no difference in achievement among all one-room students as opposed to those attending graded schools, then reorganization is not accomplishing one of its major aims, that of improving the educational achievement of the students. This is, after all, one of the big arguments used to support reorganization. It must be acknowledged that all the one room schools used in this study are part of reorganized districts and presumably have benefitted by this fact, but the problem of the one room school in the reorganized districts of Wisconsin needs further investigation.

The multiple correlation between size-cost and achievement in the schools in which seventy-eight per cent or more of the freshman class had spent their entire school life in the district was +.602. The same correlation for the schools with less than sixty per cent permanent students was a negative correlation. This difference is a phenomenon which needs further investigation and research. This correlation may or may not be significant because the chance differences for such correlations are larger than the differences as shown here, being -.60 to +.60. It is concluded that the correlations and differences between size, cost and achievement factors in the thirty-nine reorganized districts need closer and longer observation and measurement. Perhaps greater emphasis should be placed on investigation of differences found within each school as opposed to differences between schools.

It is recommended therefore, that the students of these schools be tested again as seniors to find evidence of change within the schools using the same students. Thus the effect of size and cost on the achievement of the students at the high school level will be determined. Such data could then be analyzed for differences among the schools. In effect then, the present study may be considered as having established the basic data to be used in a companion study in 1962.

Summary

The final task remaining is to summarize the findings of this study as they relate to the evaluation of the reorganized districts of Wisconsin. This evaluative summary will be limited to an interpretation of the size-cost-achievement relationships and differences among the schools as found in Chapters IV and V.

1. There was an inverse relationship between the per pupil costs and the size of the school. While this relationship was not significant, as measured by Garrett's classifications, it was consistently negative. When the mean costs and sizes of the three size groups were compared, there was a perfect negative correlation between the two factors. Thus it would seem that the smaller schools could benefit by consolidating with neighboring schools and offer a *better* educational program for the same costs or with little change in costs and could offer the *same* program at a saving in per pupil costs.
2. Achievement in the basic subjects of reading and mathematics did not seem to vary with size among the schools when the size and achievement factors were compared or correlated. The medium sized schools scored higher both on the achievement tests and on the intelligence tests. The farm students from both the medium sized and small schools scored higher on both tests than the farm students from the large school districts. In these districts it is concluded that the size of the school has little if any

influence on students' performance in the areas of reading and mathematics. This fact was further reinforced when it was found that the farm students who attended the one-room schools scored as high as their counterparts who attended the multiple-room graded schools.

3. The problem of the cost-achievement relationship remains somewhat unsettled as far as these districts are concerned. The medium cost school districts out-performed both the high cost and low cost schools but had the smallest average enrollment. When the schools were grouped according to permanence of the freshman class, the correlation between cost and achievement was significant as based on Garrett's classifications. Due to the inconsistency of the cost-achievement relationship further study is recommended in this area.
4. Many of the reorganized districts seem small to be able to offer a well rounded educational program. Fourteen schools had less than two-hundred students for a five year average enrollment in the elementary school. Sixteen had less than four-hundred total average enrollment in both the elementary and secondary schools. This means that these schools can have a well rounded elementary and secondary program only at excessively high costs which they often can not afford or do not wish to pay for.

Addenda

5. A study might well be designed which would measure the effect of varying sizes of school districts with varying costs per pupil using reorganized districts which were carefully matched for social and economic equality. A close observation and account must be made of the teachers in the various schools and the intelligence and abilities of the students would have to be measured not once but perhaps several times. The homes from which the students are drawn must also be analyzed for their effect on the achievement of the students. The study in effect must take into account all or most of the known measurable variables which affect student achievement.

BIBLIOGRAPHY

Books

Burke, Arvid J. "Finance - Public Schools", Encyclopedia of Educational Research, ed. Chester W. Harris, A project of the American Educational Research Association, New York The MacMillan Company, 1960.

Buros, Oscar K. ed. The Fifth Mental Measurement Yearbook. New Jersey: The Gryphon Press, 1959.

Butterworth, J. E. and Dawson, Howard A. The Modern Rural School. New York: McGraw-Hill Inc., 1952.

Commission On School District Reorganization. School District Organization. American Association of School Administration, Washington, D. C.: The Association, 1958.

Cronbach, Lee J. Essentials of Psychological Testing. Second Edition, New York: Harper and Brothers, 1960.

Dawson, Howard A, Reeves, Floyd W. et. al. Your School District. Department of Rural Education, National Education Association, Washington, D. C.: The Association, 1948.

Dixon, Wilfrid J. and Massey, Frank J., Jr. Introduction To Statistical Analysis. New York: McGraw-Hill Book Company Inc., 1951.

Edwards, Allen L. Experimental Design In Psychological Research. New York: Rinehart and Company Inc., 1958.

Garrett, Henry E. Statistics In Psychology and Education. New York: Langman's Green and Company, 1940.

Johns, Roe L. and Morphit, E. L. eds. Problems and Issues In Public School Finance. A project of the National Conference of Professors of Educational Administration, New York: Bureau of Publications, Teachers College, Columbia University, 1952.

Johns, Roe L. Financing The Public Schools. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1960.

Johnson, Palmer O. *Statistical Methods In Research*. New York: Prentice-Hall, Inc., 1959.

Mort, P. R. and Vincent, W. S. *A Look at our Schools*. New York: Cattill and Company, 1946.

Mort, P. R. and Reusser, W. C. *Public School Finance*, Second Edition, New York: McGraw-Hill Book Co., 1951.

Mort, P. R., Reusser, W. C. and Polley, J. W. *Public School Finance*, 3rd. ed. New York: McGraw-Hill Book Company, Inc., 1960.

Mort, P. R. et.al. *The Growing Edge*. New York: The Metropolitan School Study Council, 1947.

Norton, John K. and Lawler, Eugene S. *Unfinished Business In American Education*. Washington, D. C.: The American Council on Education, 1946.

Powell, Orvin E. *Educational Returns at Varying Expenditure Levels*. Contributions to Education, No. 573, Teachers College, Columbia University, 1933.

Rothney, John W. M. *Guidance Practices and Results*. New York: Harper and Brothers, 1958.

Rothney, J. W. M., Danielson, P. J. and Heimann, R. A. *Measurement for Guidance*. New York: Harper and Brothers, 1959.

Siegel, Sidney *Nonparametric Statistics for the Behavioral Sciences*. New York: McGraw-Hill Book Co., 1956.

Tate, Merle W. *Statistics In Education*. New York: The MacMillan Company, 1955.

Thurston, L. M. and Roe, W. H. *State School Administration*. New York: Harper and Brothers, 1957.

Woollatt, L. H. *The Cost-Quality Relationship on the Growing Edge*. Metropolitan School Study Council, New York: Bureau of Publications, Teachers College, Columbia University, 1949.

Bulletins and Pamphlets

Briscoe, Alonzo O. *The Size of the Local Unit for Administration and Supervision of Public Schools*. Contributions to Education No. 649, New York: Bureau of Publications, Teachers College, Columbia University, 1935.

Committee on Tax Education and School Finance, *Does Better Education Cost More*? Norton, John K. ed. National Education Association, Washington, D. C.: The Association, 1959.

Dawson, H. A. *Satisfactory Local School Units*. Division of Surveys and Field Studies, Field Study No. 7, Nashville, Tennessee, George Peabody College for Teachers, 1934.

Fitzwater, C. O. *School District Reorganization*. U. S. Department of Health, Education and Welfare, Washington, D. C.: Office of Education, 1957.

Gregg, Russell T. ed. *Characteristics of Good School Districts*. Madison, Wisconsin,: University of Wisconsin, 1948.

Henzlik, F. E. and Chisholm, Leslie L. *Nebraska Looks at Her Districts*, Lincoln, Nebraska: University of Nebraska Press, 1948.

Kreitlow, B. W. *What Shall We Do About Our School*? Madison, Wisconsin: University of Wisconsin College of Agriculture Extension Division Special Circular 20, 1951.

Little, J. Kenneth. *Explorations Into the College Plans and Experiences of High School Graduates*. Madison: University of Wisconsin, 1959.

New York State Educational Conference Board. *School Quality and Local School Government*. Albany: The Board, 1956.

Articles and Periodicals

Ackley, Clarence E. "Economy Through Organization of School Districts", *American School Board Journal* (June 1954) 128: 48.

Associated Public School Systems. Relation Between Cost and Quality in Public Education. Reported from: *Does Money Make a Difference? Education Digest*, (November 1958) 29-31.

Bertrand, J. R. Relationship Between Enrollment of High Schools From Which Students Graduated and Academic Achievement of Agricultural Students, A. and M. College of Texas. *Journal of Experimental Education*, (September 1956), 59-69.

Capital Times, April 8, 1943.

Cooper, Shirley. District Organization. Review of Educational Research, Vol. 19 No. 4. (October 1949)

Cushman, M. L. Principles of School District Reorganization, an address delivered to the Midwest Area meeting of the National School Boards Association, July 24, 1954, Reported in *Wisconsin School Board News*, (October and November 1954)

Dawson, Howard A. and Ellena, Wm. J. School District Reorganization, *School Executive* 73 (July 1954) 39-42.

Dawson, Howard A. District Reorganization, *School Executive* (January 1955) 74: 86-87.

Doudna, Quincy. Rural Education. *Dairyland News*. August 13, 1945.

Dwyer, P. S. Some Suggestions Concerning the Relationship Between Size of High School Attended and Success in College. *Journal of Educational Research.* 1938, 32: 271-281.

Fowlkes, John Guy. For School District Reorganization. Quoted from Wisconsin School Board News, 1945 in *Milwaukee Journal* May 10, 1945.

Hutchins, Clayton D. and Munse, Albert R. Expenditure for Education in Various Sizes of School Districts, School Life May 1953, 35: 127-128.

James, H. T. Schools and Their Master, Wisconsin School Board News, October 1955.

Kreitlow, Burton W. Does School Size Make a Difference in Educational Opportunity? Wisconsin Journal of Education, (March 1959) Vol. 91, 8: 17-18.

Milwaukee Journal, School Merger Stirs Turmoil, July 10, 1940.

Milwaukee Journal, Progress in School Reform, July 14, 1940.

Nation's Schools, What Size School is Best? Nation's Schools 54: 59 October 1954.

National Education Association, Research Bulletin (April 1959) Vol. 37, No. 2.

Wyngaard, John. Under the Capitol Dome. The Appleton-Post Crescent. January 26, 1946.

Unpublished Material

Atwood, Harry Mason. "An Analysis of Achievement By Selected Superior University of Wisconsin Freshmen With Implications for the Development of Enrichment Materials for High School Mathematics", Unpublished Ph.D. dissertation, University of Wisconsin, 1958.

Bales, Ralph Carroll. "Some Relationships Between Size of School and Academic Achievement of High School Seniors in Florida", Unpublished Ph.D. dissertation, University of Florida, 1952.

Borsuk, Charles Seymour. "A Comparative Study of Persisting and Non-Persisting Students at the University of Wisconsin", Unpublished Ph.D. dissertation, University of Wisconsin, 1959.

Dickenson, Elbert Lee. "An Analysis of the Relationship of Size of Arkansas High Schools to Academic Success of Graduates in the First Year at The University of Arkansas", University of Arkansas, 1958.

Eisemann, Carl. "A Restudy of the School Districts in Two Rural Communities to Determine the Effects of Reorganization", Unpublished Ph.D. dissertation, University of Wisconsin, 1956.

Kreitlow, B. W. "A Study of the Teaching of Letter Writing in the Sixth Grade Graded Schools and Ungraded Rural Schools", Unpublished Ph.D. dissertation, University of Minnesota, 1949.

Kreitlow, B. W. "New Facts on School District Reorganization", Unpublished mimeographed article available by writing to Dr. Kreitlow, 215 Education Building, University of Wisconsin, Madison, Wisconsin. (August 1959)

State of Wisconsin, Department of Public Instruction. "Tabulation of School District Organization in Wisconsin as of October 1, 1959", unpublished mimeographed data. The Department, Madison, Wisconsin (October 1959)

State of Wisconsin, Department of Public Instruction. "Wisconsin High School Statistics", Unpublished mimeographed material. The Department, Madison, Wisconsin, 1958.

Woodham, William Jesse, Jr. "The Relationship Between the Size of Secondary Schools, The Per Capita Costs and The Breadth of Educational Opportunity", Unpublished Ph.D. dissertation, The University of Florida, 1951.

Young, John Frederick. "A Comparison of the Academic Preparation and Achievement of College Students from Various Size High Schools in Indiana, Purdue University, 1958.

APPENDIX A

No. 236,S. Published July 15, 1939.

CHAPTER 228.

AN ACT to amend subsections (1) and (6) of section 40.30 of the statutes, relating to the creation, alteration and dissolution of the common school districts.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

Section 1. Subsections (1) and (6) of section 40.30 of the statutes are amended to read: (40.30) (1) Upon the filing of a petition by an elector or upon their own motion town and village boards and councils of cities of the second, third and * * * Fourth class may, by order, create, alter, consolidate or dissolve * * * school districts. Such districts shall be known by the names of the municipalities in which they lie, and if there is more than one district in a municipality, those districts shall be further designated by numbers. Such districts must be of contiguous territory, and no territory shall be detached from a district unless it be by the same order attached to another district, and no district shall be created having less than one hundred fifty thousand dollars of taxable property as shown by the last assessment roll. * * * No change in districts may be made that will result in additional claims for state aid under the provisions of section 40.87, notwithstanding the provisions of section 40.31, without the approval of the state superintendent of public instruction. Any person aggrieved by any order issued and recorded pursuant to the provisions of this section or aggrieved by the refusal of the municipal boards to file orders of alteration, dissolution, or creation when petitioned to do so may appeal therefrom to the state superintendent within thirty days following the issuing and recording of any such order, or where the boards refuse or neglect to issue and record an order or alteration, dissolution or creation then within ninety days following the filing of the petition. The state superintendent is authorized, on his own motion, by order to attach districts with valuations of less than one hundred thousand dollars to contiguous districts.

(6) Every order shall be promptly filed and recorded in the office of the clerk of the municipality in which the school districts affected by the order are situated (and if in more than one, a sufficient number of originals shall be executed so that one may be filed with each municipal clerk), and * * * one copy of such order shall be mailed to the county superintendent, and one copy of such order shall be mailed to the state superintendent. An appeal may be taken from any decision of the said state superintendent within thirty days from date of said decision to the circuit court of any county affected.

Section 2. This act shall take effect upon passage and publication.

Approved July 12, 1939.

APPENDIX B

Section 9. 40.303 of the statutes is created to read:

40.303 County School Committee. (1) CREATION, MEMBERSHIP. There shall be created in each of the counties of this state a county school committee consisting of 6 members to be elected by the county board. Three of such committee members shall be residents of incorporated cities or villages of the county and 3 shall be residents of towns of the county. Of the village or city members first elected one shall serve for a term of one year; one for a term of 2 years and one for a term of 3 years; and of the town members first elected one shall serve for a term of one year; one for a term of 2 years and one for a term of 3 years. Thereafter members shall each be elected for a term of 3 years. Any vacancy caused by resignation, death or removal of residence from the county shall be filled by appointment by the chairman of the county board for the remainder of the unexpired term, subject to confirmation by the county board at its next succeeding meeting. Upon failure of the county board to approve of an appointment made by the chairman of the county board, the board shall elect a successor to fill the vacancy for the balance of the unexpired term. Resignations shall be made in writing to the county school committee and shall be filed with the county superintendent of schools. The county superintendent shall serve as secretary of the committee but shall not be entitled to vote.

(2) NOMINATION OF COMMITTEE MEMBERS. The education committee of the county board, or if no such committee exists, a committee designated by the chairman of the county board, shall nominate candidates for the county school committee equal in number to the number of committee members to be elected. Such nominations shall be made at least 30 days before the meeting of the board at which the election is held, except that the 30-day provision shall not apply to the initial election if the first meeting of the county board following the effective date of this section is held less than 30 days after such effective date. Persons nominated shall have a recognized interest in and understanding of, and sympathy for the problems of common schools.

(3) ELECTION OF COMMITTEE MEMBERS. At the first meeting of each county board following the effective date of this section, the board shall elect a county school committee as provided in this section. If appointments are not made by any county board or boards within the time limitations herein specified, the state superintendent shall forthwith make said appointments.

(4) DUTIES OF COMMITTEE. The county school committee shall draft a plan for school district reorganization of the school districts within the county and shall hold hearings in each proposed reorganized district or at a convenient place within a reasonable distance therefrom. After approval by a majority vote of its membership, the committee may, by order, create, alter, dissolve, or attach school districts subject to the conditions set forth in section 40.30 (1). The order by the county committee shall be final except that any person aggrieved by any order of a county school committee issued and recorded pursuant to the provisions of this section or aggrieved by the refusal or neglect of a county school committee to file orders of alteration, dissolution, consolidation or creation when petitioned to do so may appeal therefrom to the circuit court of the county in which the territory described in the petition lies, within 30 days following the issuing and recording of any order, or where a board or county school committee or county school committees refuse or neglect to issue and record an order of alteration, dissolution, consolidation or creation then within 90 days following the filing of the petition.

(5) STATE SUPERINTENDENT TO ADVISE. The state superintendent shall advise and consult with the several county school committees. Whenever in his opinion any school district or districts shall be created, altered, consolidated or dissolved, he may make his recommendations to the county school committee or committees of the county or counties within which the territory affected is situated.

(6) JOINT COUNTY COMMITTEE ACTION. When any territory to be affected by a proposed school district creation, alteration, consolidation or dissolution lies in 2 or more counties the county school committees of said counties shall act as a joint committee. If the membership of a joint committee is an even number then the circuit judge of the circuit in which the greatest valuation of property to be affected lies, shall appoint an additional member to the joint committee from one of the counties affected.

(7) COMPENSATION. Each member of the county school committee, except the county superintendent of schools, shall receive per diem of $5 per day for each day he attends a meeting of said county school committee. Each member of the committee shall also receive for each day he attends a meeting of the committee compensation for other necessary expenses and mileage at the rate of 6 cents per mile for each mile traveled in going to and returning from the place of meeting by the most usual traveled route. Such per diem, mileage and expenses shall be paid by the county.

APPENDIX C

(No. 48, S.)

CHAPTER 563, LAWS OF 1959

AN ACT

AN ACT to create 40.035 of the statutes, relating to the requirement that all territory in the state be in school districts operating high schools.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION L. 40.035 of the statutes is created to read:

40.035 TERRITORY TO BE IN DISTRICT OPERATING HIGH SCHOOL. (1) After June 30, 1962, all territory within the state shall be included in school districts operating high schools.

(2) Between the effective date of this section and June 30, 1962, territory not included in a district operating a high school may be attached to, created into or consolidated with a district operating a high school by any of the procedures under ss. 40.03, 40.06, 40.07, 40.12 or 40.14, if the order is made before July 1, 1962.

(3) Any territory which is not included in a district which operates a high school on July 1, 1962, shall be attached to, created into or consolidated with a district operating a high school by order of the county school committee not later than July 31, 1962. Such order shall be subject to the following conditions:
(a) It shall be retroactive in effect to July 1, 1962.
(b) It shall be subject to appeal to the state superintendent but not to a referendum.

(4) If the county school committee fails to make such as order as is required by sub. (3) an action of mandamus may be brought to require the committee to perform this duty.

(5) For the purposes of this section the term "district" operating a high school" shall be construed to include any newly created district which substantially meets the requirements set forth herein, but which may require a reasonable amount of time to plan, build and operate a new school.

(6) Within 60 days of the receipt of an order made pursuant to this section the city council in a city operating under a city school system may be ordinance enacted by a two-thirds vote of all the members elect annex or consolidate for all purposes such portion of the territory not then a part of a district operating a high school which is included within the order as is urban in character or reasonably necessary for proper growth of the city. Such ordinance shall be effective 90 days after its passage and publication unless within such time a petition for a referendum on the question of annexation or consolidation for all purposes is filed with the city clerk signed by 10 per cent of the electors residing in the territory on the date the petition is filed, in which case the ordinance shall not be effective unless approved by more than 50 per cent of the electors voting in such referendum. The referendum shall be conducted as provided in s. 66.021 (5) as far as practicable. If the electors of the territory vote in favor of consolidation, then the city shall conduct a referendum as required by s. 66.02 for the purpose of effecting a consolidation, and if said referendum fails the territory shall nevertheless become a part of the city for school purposes. Any territory included in such order which is not involved in any petition for annexation or consolidation shall become a part of such city school system as a result of such order. This section shall not apply to counties containing a city having a population of 500,000 or more.

(7) If the order made pursuant to this section includes territory in more than one municipality, upon petition therefor a referendum shall be submitted in each such municipality independently and the vote thereon in any municipality shall be effective only with respect to the territory in such municipality.

Senate:

Engrossed Bill: Ayes, 24; Noes,7; Paired,2.

Assembly Amendments 3, A. and 5, A. concurred in by voice vote.

Assembly Amendment 4, A.: Ayes, 18; Noes, 15.

Assembly: Ayes, 63; Noes, 28.

APPENDIX D

Form 2B

CATALOG NO. 362-02-1

Cooperative

Sequential Tests of Educational Progress

Reading

©Copyright 1956, 1957 All rights reserved

Cooperative Test Division · Educational Testing Service · Princeton, N. J. · Los Angeles 27, Calif.

General Directions

This is a test of some of the understandings, skills, and abilities you have been developing ever since you first entered school. You should take the test in the same way that you would work on any new and interesting assignment. Here are a few suggestions which will help you to earn your best score:

1. Make sure you understand the test directions before you begin working. You may ask questions about any part of the directions you do not understand.
2. You will make your best score by answering *every* question because your score is the number of correct answers you mark. Therefore, you should work carefully but not spend too much time on any one question. If a question seems to be too difficult, make the most careful guess you can, rather than waste time puzzling over it.
3. If you finish before time is called, go back and spend more time on those questions about which you were most doubtful.

DIRECTIONS FOR PART ONE

Each of the questions or incomplete statements in this test is followed by four suggested answers. You are to decide which one of these answers you should choose.

You must mark all of your answers on the separate answer sheet you have been given; this test booklet should not be marked in any way. You must mark your answer sheet by blackening the space having the same letter as the answer you have chosen. For example:

0 Which one of the following is an animal?
- **A** Bed
- **B** Dog
- **C** Chair
- **D** Box

Since a dog is an animal, you should choose the answer lettered B. On your answer sheet, you would first find the row of spaces numbered the same as the question—in the example above, it is 0. Then you would blacken the space in this row which has the same letter as the answer you have chosen. See how the example has been marked on your answer sheet.

Make your answer marks heavy and black. Mark only one answer for each question. If you change your mind about an answer, be sure to erase the first mark completely.

Do not turn this page until you are told to do so.

PART ONE

(Mrs. Pembroke, proprietress of a dressmaking shop, is interviewing Gracie Abbot, an eager young girl. Mrs. Abbot, Gracie's mother, is a neatly dressed little woman who looks as if she had worked too hard all her life.)

Mrs. Pembroke: Well, Mrs. Abbot, I understand that you want your daughter to come to us?

Mrs. Abbot: I won't go as far as that, Mrs. Pembroke. If I'd my way, I'd sooner she stayed at 'ome.

Gracie: Mother!

Mrs. Abbot: You see, she's the oldest of five. So there's plenty for 'er to do.

Gracie: Mother, you said you'd let me come.

Mrs. Abbot: So you can. (*To Mrs. Pembroke*) I just want to make sure that she's in the right hands.

Mrs. Pembroke: Of course you . . . . Well, Gracie, why do you want to come to business?

Gracie: I want to see life. I don't want only to be at 'ome.

Mrs. Pembroke: I see. And why did you choose dressmaking?

Gracie: It's either that or bein' a typist! I don't want to sit typewriting all the rest of my life.

Mrs. Pembroke: Well, if you come here, you ought to go into the workrooms for a year or two. That means sitting.

Gracie: Do I have to?

Mrs. Pembroke: Only if you want to get on.

Mrs. Abbot: I daresay she'll be gettin' married.

Gracie: No, I shan't. Gettin' married only means a lot of kids and no time to yourself the whole blessed day!

Mrs. Abbot: Gracie Abbot! . . . Don't you be listenin' to her, Mrs. Pembroke. They're all like that nowadays. They none of them want to do anything that looks like bein' a bit dull.

Mrs. Pembroke: Did young people ever want to do anything dull?

Mrs. Abbot: I 'ad to.

Mrs. Pembroke: So had I. But I didn't want to.

1 When Gracie says, "Do I have to?" the author i trying to show that she
A is stubborn
B complains a great deal
C does not want to work
D wants an exciting job

2 Mrs. Abbot wishes that Gracie would
E earn some money
F help with the work at home
G get married
H study typing instead of dressmaking

3 The kind of words used in the passage shows tha
A all the characters have had equal educationa advantages
B Gracie is better educated than her mother
C Mrs. Pembroke speaks more correctly than th Abbots
D Mrs. Abbot is more careful of her speech tha Gracie

4 Probably Gracie does not wish to marry becaus she
E prefers typing
F sees more opportunity in dressmaking
G is a lazy housekeeper
H sees what marriage has done to her mother

5 This passage presents a problem related chiefly t
A employment practices
B women in industry
C parent-child relationships
D classes in society

Go on to the next pag

My father was the kind every American boy ought to have.

He was an all-round man. He could whittle a boat for a small boy to play with and build one for a big boy to row in. He could rig a sail, shoot wild geese, and break a horse or swap one. He told stories, drew pictures, and sang songs—but he could make good hay and raise fine potatoes just as well. He built good houses and good soil and strong children. He was his own boss. He was a three-ring circus, with every ring going at once. He was as young as his youngest boy.

My father was a handsome man and big-built, like his own oxen. Square was the word for him—from his curly head to the toes of his cowhides. He was good-looking because he had been out in the rain all his life. His skin was the color of acorns. His mustache was the gates-ajar kind, turned up at the ends to make him look as if he was always smiling. He generally was, too.

My father was self-made, like the best Americans. He educated himself on his belly in front of the kitchen fireplace, and never stopped reading when he grew up. For a farmer and a fisherman he had a large library—about two thousand volumes. He was well up in geography, astronomy, navigation, politics, and agriculture. History was a favorite with him, and he liked books about big men. He wanted his children—there were ten of us—to grow up smart and be somebody. We got our education in the red-brick schoolhouse, but he taught each boy a trade, too. One became the family boatbuilder, another the family carpenter. I was the mason, and I have chimneys and walls to my credit.

When he felt his age on him, my father knocked off work long enough to travel to the four corners of America. He looked at the Grand Canyon, the redwoods, Puget Sound, Los Angeles, the deserts, the Mississippi, the Southern plantations. He saw America built up and thriving. But he had been building that same America all his life. He had been farmer, sailor, boatmaker, fisherman, reader, country gentleman, hunter, thinker, believer in life, lover of life, a builder of soil and men. He had earned his rest. He had helped make our land a place where a common hard-working man walks like a king.

6 What were the father's chief occupations?

- **E** Boatbuilder and carpenter
- **F** Farmer and fisherman
- **G** Storyteller and singer
- **H** Horsebreaker and circus rider

7 Which one of these is NOT mentioned in the article?

- **A** The author's brothers and sisters
- **B** The author's trade
- **C** The author's mother
- **D** The author's education

8 The author's attitude toward his subject is

- **E** critical
- **F** approving
- **G** amused
- **H** dependent

9 The comparison "a common hard-working man walks like a king" in the closing sentence is

- **A** suitable
- **B** preposterous
- **C** an understatement
- **D** inappropriate to the facts given previously

10 In which of the following orders does the author present his subject?

- **E** Appearance, versatility, education, closing years
- **F** Education, appearance, versatility, closing years
- **G** Versatility, closing years, education, appearance
- **H** Versatility, appearance, education, closing years

Go on to the next page.

6061 Chapen Street
New Haven, Connecticut
November 15, 1955

Dear Alma,

How I wish I were in the Adirondacks with you now! In fact, I hardly need your description of the beauty of the scenery; my imagination tells me how it looks.

Here in New Haven many people are beginning to plan their Thanksgiving dinners, and a few of the more enthusiastic have actually begun Christmas shopping. Nothing we can devise for Thanksgiving, however, can compare with your glorious outdoor surroundings, sleigh rides, skiing parties, and hiking expeditions.

This past week the weather was so cold that the Liberty Ice Skating Rink raised the white flag with the red circle. On Monday night Clara and George came over and invited me to go ice skating. Bravely, I took my brand-new skates out of their box and ventured forth.

When we reached the rink, I stood for a few minutes watching the skaters glide by. Their movements were so effortless and graceful that my fears vanished. "Pooh," I thought to myself, as George laced my skates, "nothing to it. I'll be cutting figure eights in no time." Confidently I stood up, airily waved Clara and George aside, and took two steps—just two. The next instant I was sitting on the ice, staring in pained bewilderment at my feet. Amid sympathetic "tut-tuts" from Clara, I picked myself up and tried again—and again, far into the night. Although I am still no Sonja Henie, I have now persuaded my feet, my ankles, and the ice skates to travel in the same direction at the same time.

Even the animals seem to know it will soon be winter, and all sorts of strays are found in New Haven High School. Yesterday a cat wandered into one of the back seats of the study hall and gave vent to his feelings by a series of yowls that would have done justice to a young lion. He kept up his serenade until he was unceremoniously seized by the neck and hustled to the door.

We're having an exciting time in school preparing for the mid-term tests. The teachers seem to be having a contest to see who can give the most homework, and it's still anybody's race.

Write soon and tell me when you're coming home.

Affectionately yours,

Doris

11 The writer's mood is one of

A forced gaiety **B** a desire to show off
C a sense of duty **D** honest pleasure

12 Why was the flag raised?

E The weather was too cold for skating.
F The festivities for Thanksgiving had begun.
G The rink was open to skaters.
H The Christmas shopping season had begun

13 Which one of the following sentences in the ter is probably said especially to please Alma

A "Nothing we can devise for Thanksgiving . (lines 12–14)
B "When we reached the rink . . ." (lines 20 21)
C "Even the animals seem to know . . ." (li 33–35)
D "He kept up his serenade until . . ." (lines 40)

14 In line 39, "unceremoniously" means

E angrily **F** abruptly
G forcibly **H** boldly

15 Doris intends chiefly to

A persuade Alma to come home
B describe winter in her present location
C give an account of her skating experience
D tell Alma what has been happening

When supper was over, when the family and B Buck sat in front of the fireplace in the other ro Jody anxiously watched Grandfather. He saw signs he knew. The bearded head leaned forward; eyes lost their sternness and looked wonderingly into fire; the big lean fingers laced themselves on the bl knees. "I wonder," he began, "I just wonder whet I ever told you how those thieving Piutes drove *thirty-five of our horses.*"

"I think you did," Carl interrupted. "Wasn't it j before you went up into the Tahoe country?"

Grandfather turned quickly toward his son-in-l "That's right. I guess I must have told you that stor

"Lots of times," Carl said cruelly, and he avoided wife's eyes. But he felt the angry eyes on him, and said, " 'Course I'd like to hear it again."

Grandfather looked back at the fire. His fingers laced and laced again. Jody knew how he felt, how insides were collapsed and empty. Hadn't Jody b called a Big Britches that very afternoon? He rose heroism and opened himself to the term Big Britcl again. "Tell about Indians," he said softly.

16 Carl said "Lots of times" because he

E wanted to make his wife angry
F didn't believe the story was true
G didn't want to hear the story again
H didn't want to hurt Grandfather

Carl suggests that Grandfather retell his story because

A he knows Jody wants to hear it
B he senses that his wife is angry at what he has just said
C he is sorry for what he said
D he has forgotten the story

The author's chief purpose in telling the incident is

E to portray character
F to illustrate heroism
G to picture the Tahoe country
H to relate an exciting happening

The passage does NOT suggest

A why the wife was angry
B why Jody was anxious
C what made Carl interrupt Grandfather
D what Billy Buck thought

The story is told from the viewpoint of

E Carl **F** Carl's wife
G Grandfather **H** Jody

ANGUS McGREGOR

Angus McGregor lies brittle as ice,
With snow tucked up to his jaws,
Somewhere tonight where the hemlocks moan
And crack in the wind like straws.

Angus went cruising the woods last month,
With a blanket-roll on his back,
With never an ax, a dirk, a gun,
Or a compass in his pack.

"The hills at thirty below have teeth;
McGregor," I said, "you're daft
To tackle the woods like a simple child."
But he looked at me and laughed.

He flashed his teeth in a grin and said:
"The earth is an open book;
I've followed the woods for forty years;
I know each cranny and crook.

"I've battled her weather, her winds, her brutes;
I've stood with them toe to toe;
I can beat them back with my naked fist
And answer them blow for blow."

Angus McGregor sleeps under the stars
With an icicle gripped in his hand,
Somewhere tonight where the grim-lipped peaks
Brood on a haggard land.

Oh, the face of the moon is dark tonight,
And dark the gaunt wind's sigh;
And the hollow laughter troubles me
In the wild wolves' cry.

21 In this poem, the poet makes us realize that nature

A can be a bitter foe **B** is a trusted friend
C is an open book
D can be dealt with blow for blow

22 We may infer from the poem that Angus McGregor

E was inexperienced
F took a reckless chance
G was overcome with fear
H made a foolhardy wager

23 The poet's purpose is to show that

A man alone, unequipped, cannot defeat nature
B it does not pay to be too sure of oneself
C both **A** and **B** are true
D neither **A** nor **B** is true

24 There is grim irony in Angus McGregor's fate: Nature seems to be paying him back for his

E boasting **F** battling
G brooding **H** laughing

25 The last two lines of the poem suggest that

A Angus was battling hopelessly with the wolves
B Angus's defeat haunts the storyteller
C the wolves were pursuing Angus
D there would be no sleep for Angus

Go on to the next page.

Answering employment ads is not only a matter of industry and persistence; it is also a matter of skill. I advise two simple rules: You must present all of your qualifications, regardless of whether or not they are asked for, and you must clearly bring out the particular qualifications the employer specifies in his ad.

Sending a résumé or general statement of all of your qualifications readily satisfies the first rule. To take care of the second, the résumé should be accompanied by a letter specifically referring to the qualifications requested in the ad you are answering.

Here are a few important don'ts:

Don't simply put a copy of the résumé into an envelope and mail it off without a letter. It is not good manners. It indicates no strong desire for the particular position, but rather an "I'm here if you want me" attitude. It requires the recipient to locate in the résumé the qualification he has asked for. It may, if the firm is running more than one ad, be misunderstood as an application for the wrong position. Most important, it neglects your only chance to point out the special qualifications you may have.

Don't use a mechanically reproduced form letter.

Don't write a perfunctory and stilted letter of the sort employers receive by the dozens, such as:

"In answer to your ad, the enclosed résumé shows I am very well qualified for the position. I will be glad to hear from you with regard to an interview."

This type of letter accomplishes exactly nothing—because it says nothing.

26 The word "résumé," as used in the passage, refe to

E an accompanying letter
F a list of important "don'ts"
G a summary of qualifications
H a carbon copy of a letter of application

27 A good letter of application should

A indicate that the writer is eager to get the jo
B point out the writer's special qualifications f the job
C mention the particular position advertised
D do all of these things

28 The passage falls into two sections. The seco section begins with

E "Sending a résumé. . . ." (line 7)
F "Here are a few important don'ts. . . ." (line 1
G "Don't simply put a copy. . . ." (line 13)
H "In answer to your ad. . . ." (line 26)

29 The author's purpose in this passage is to tea the reader how to

A write a satisfactory business letter
B apply by mail for an advertised position
C get an interview with a businessman
D assess his own qualifications for a job

30 The author does NOT include

E directions for the proper form of a business l ter
F advice on being considerate of the busy exec tive
G the suggestion that the applicant state his qu ifications
H advice on how to make a good impression

Calmly and confidently, Britain's new Prime Minister took the torch from the old Titan's hand and prepared to carry on in his place. Sir Anthony Eden, 57, had waited patiently for the summons that he knew must come; the change had long been accepted as inevitable; the transition was smooth and speedy. Yet when it did come, the replacement of their great Prime Minister struck Britons with all the suddenness of the sun going down behind Ben Nevis.

One moment Sir Winston Churchill was there in all his glory—venerable as Queen Victoria, familiar as Big Ben. Next moment, or so it seemed, the dauntless old figure had vanished, and Britain had the feeling hat John Bull himself was gone. At 4:25 p.m., in the quiet of an April afternoon, 80-year-old Sir Winston Spencer Churchill put on his black frock coat and drove off to see the Queen.

Next day Elizabeth sent for the tall, handsome grey-headed figure who had waited in the Foreign Office as Sir Winston drove to the palace. Top hat gleaming, Sir Anthony Eden drove along the Mall as he Scots Guards wheeled and stomped in the blaze of color and trumpets that is the changing of the palace guard. Approaching the iron gates, his chauffeur blinked the Humber's lights in a recognition signal. The sentries crashed their rifles in salute.

Eden's talk with the Queen lasted half an hour. At the end, she clenched her fists and held them out before him, the right on top of the left, to symbolize he holding of the Sovereign's sword. Sir Anthony knelt and kissed them, thereby accepting the office of Prime Minister and First Lord of the Treasury.

31 "Titan's" in the first sentence means
- **A** Winston Churchill's
- **B** John Bull's
- **C** Queen Victoria's
- **D** Queen Elizabeth's

32 Apparently the author believes that the people of Britain regard Churchill's long term of office as
- **E** a regrettable interlude
- **F** a momentous period
- **G** a beginning of greater glory for Britain
- **H** a decline in the power of the Prime Minister

33 The material in this passage could be divided into three parts, with the break between the second and third parts coming between
- **A** paragraphs 1 and 2
- **B** sentences 2 and 3 in paragraph 2
- **C** paragraphs 2 and 3
- **D** paragraphs 3 and 4

34 The changing of the palace guard incident
- **E** is a distracting detail
- **F** modifies the meaning of the whole passage
- **G** reinforces the feeling the author is trying to create
- **H** is necessary in the development of the topic

35 The author might have called this passage "Changing of the Guard"
- **A** as a reference to the palace guard at Buckingham
- **B** because Churchill was relinquishing his position of watchfulness as head of state
- **C** because Eden was to take over the main responsibility for Britain's welfare
- **D** for all of these reasons

STOP

***Stop.* If you finish before time is called, check your work on this part. Do *not* go on to Part Two until you are told to do so.**

DIRECTIONS FOR PART TWO

Part Two contains the same kind of material as Part One. Mark your answers in the same way.

Do not turn this page until you are told to do so.

PART TWO

(1) No beast on land or sea has ever been so misrepresented, feared and vilified as the octopus. Its very name, devilfish, damns it. It has come to stand for horror and evil.

(2) The truth is that the octopus, for centuries the prey of eels, especially the ferocious moray, and of humans, is deathly afraid of anything larger than he is.

(3) "The octopus," wrote Edward Ricketts and Jack Calvin in *Between Pacific Tides,* "has eyes as highly developed as ours, and a larger and better functioning brain than any other invertebrate animal." It has the same five senses that we ourselves possess, and its muscular system, with great strength and perfect control of all its eight tentacles, is in many ways equal to ours.

(4) During the past few years, many experiments have been made to see just how intelligent these big mollusks really are. Dr. Paul Schiller, a zoologist studying animal intelligence at the Yerkes Laboratories in Orange Park, Florida, trained an octopus to push the lid off a jar to get at a crab inside.

(5) Another octopus was presented with a white card along with a crab to which an electric wire was attached. The instant the octopus touched the crab it got a shock. Then it was fed an ordinary crab and got no shock. After only three experiments it learned to leave the crab with the white card alone.

(6) The value of these experiments, for science, lies in the fact that the brain of the octopus is far more accessible than in any creature protected by a skull. One part or another of an octopus' brain can be delicately cut away and the effects on octopus behavior observed. Since there is much to be learned about how our own brains work, scientists hope to learn more about us by experiments on the humble octopus.

1 The passage tells us that scientific experiments are being conducted to see

A how intelligent the octopus is
B what animals the octopus fears most
C how keen the sight of an octopus is
D whether the octopus has a brain

2 The author is concerned because most people think of the octopus as

E terrifying
F useful
G intelligent
H humble

3 The author's chief purpose is to

A analyze the work of marine explorers
B interest the reader in invertebrates
C show how scientists study marine life
D explain the value of studying the octopus

4 Which paragraph breaks away from the thoug
of the opening sentence?

E Paragraph 2
F Paragraph 3
G Both paragraph 2 and paragraph 3
H Neither paragraph 2 nor paragraph 3

5 Paragraph 5 is more convincing than paragrapl
because it tells

A why the experiments were made
B what type of bait was used to train the octop
C how many trials were made before the octop
learned its lesson
D what the octopus learned to do

MAMIE

Mamie beat her head against the bars of a little I
diana town and dreamed of romance and b
things off somewhere the way the railroad trai
all ran.

She could see the smoke of the engines get lost dov
where the streaks of steel flashed in the sun, a
when the newspapers came in on the morni
mail she knew there was a big Chicago far c
where all the trains ran.

She got tired of the barbershop boys and the post-offi
chatter and the church gossip and the old piec
the band played on the Fourth of July and Dec
ration Day

And sobbed at her fate and beat her head against t
bars and was going to kill herself

When the thought came to her that if she was going
die she might as well die struggling for a clutch
romance among the streets of Chicago.

She has a job now at six dollars a week in the baseme
of the Boston Store,

And even now she beats her head against the bars
the same old way and wonders if there is a bi
ger place the railroads run to from Chicago whe
maybe there is

romance
and big things
and real dreams
that never go smash.

6 When Mamie "beat her head against the bars
she

E felt frustrated
F was imprisoned
G had gone mad
H was perplexed

Go on to the next pag

7 Lines 21–28 indicate that Mamie believes

- **A** romance is found in Chicago
- **B** travel will bring her the happiness she desires
- **C** a bigger city will offer her happiness
- **D** happiness is where one finds it

8 The poem reaches a turning point in lines

- **E** 10–13
- **F** 14–15
- **G** 16–18
- **H** 21–28

9 In Chicago, Mamie found

- **A** the clutch of romance she had dreamed of
- **B** the same old bars she had been beating her head against
- **C** the same old gossip and chatter she had left
- **D** the exciting job she had applied for

0 Which of the following characteristics usually associated with poor writing gives this poem particular strength because of its theme?

- **E** Use of the same subject for most sentences
- **F** Stringy sentences
- **G** Repetition of whole expressions
- **H** All of these

Some people need to be lured into travel by the
hreat or promise of Hopi snake-dancers, the Taj Ma-
al, or at least the music of faraway names. I don't.
lthough I like new places as much as the next one,
also like the mere act of getting there. More particu-
rly I like trains—American trains—regardless of
here they are going.

In fact, I like them so much that if it were possible I
ould be tempted to exchange my bed for a berth,
ave it draped with heavy green curtains, equip it with
machine to rock me gently while I sleep, and insure
y slumber by installing a sound track to release such
lessed night sounds as distant whistles, clanging road
gnals, passing freights, the clackety-clack-clack of the
ail joint and the hum of ties.

A train is self-contained and the fact that you have a
estination is almost forgotten when you surrender
ourself to such comforts as a railroad alone can pro-
ide. The wise traveler rejoices in the fact that he is
s free from time as he is from the telephone. Unless
ad news has summoned him, or worries lie ahead, a
ain can become for him a place of refuge; a restful
ause in life; a sanctuary on wheels which devours
pace even as it annihilates time.

Year after year I have swung down, up, and around
e United States on trains of all kinds. During lecture
ours I have slept on them for twenty-five consecutive
ights. Streamlined wonders, expresses, locals, trans-
ontinentals, chromium or plush, air-conditioned or
ust-blown, electrified or steam. I have fallen onto
hem at two in the morning at flag stops during a bliz-
ard, and fallen off them in strange cities at dawn.
nd I have never lost my fondness for them.

11 For the author, a train is

- **A** a surrender to time
- **B** a promise of adventure
- **C** an escape from sight-seeing
- **D** a haven of rest and relaxation

12 An appropriate title for this passage would be

- **E** "Look Where You're Going!"
- **F** "I Like Trains"
- **G** "The Wise Traveler"
- **H** "Going Places"

13 What part of travel does the author like best?

- **A** Arriving at his destination
- **B** Hearing the sound of faraway names
- **C** Being on the way
- **D** Watching a train pull into the station

14 In the first paragraph, the author

- **E** compares two similar points of view
- **F** develops a single point of view
- **G** contrasts two different points of view
- **H** criticizes one point of view

15 For the effect he wishes to achieve in this essay, the writer deliberately

- **A** understates his position
- **B** overstates his position
- **C** compares his position with the positions of other people
- **D** contrasts his position with the positions of other people

Go on to the next page.

The rise or fall of the popover depends upon having the ingredients at room temperature, mixing the ingredients properly, and using the right heat at which to bake them. Evolution has not spared the popover—at one time the batter for this bag of wind was beaten for a long time. Now the authorities suggest that you beat it for about 2 minutes by hand or 1 minute if you are using an electric beater.

As to the insistence that popovers be baked in greased, preheated iron pans, that, too, is dated. You may bake them in metal pans or in greased or oiled cold custard cups. You may bake popovers at different degrees of heat, too. The old way—hot oven (450°) for ½ hour, followed by a moderate oven (350°) for 15 minutes, or until done—has given way to an even oven temperature throughout the baking period —425° or 450° for about 40 minutes, or until done.

What is "until done"? A popover should be crisp, brown, and glossy on the outside and soft but not soggy on the inside. The good old toothpick may be used as a tester. It should come out dry.

16 The new way of baking popovers calls for
- **E** a 400°–450° temperature for 45 minutes
- **F** a 425°–450° temperature for 40 minutes
- **G** a 350° temperature for 15 minutes
- **H** a 450° temperature for 30 minutes

17 Do you think anyone given just these directions would be able to make good popovers?
- **A** Yes, because the directions tell everything necessary
- **B** Yes, because the directions are sensible
- **C** No, because it is not clear which baking directions to follow
- **D** No, because they don't include the ingredients

18 The author succeeds chiefly in
- **E** giving hints for making popovers
- **F** showing the pitfalls involved in baking popovers
- **G** presenting a recipe for any biscuit or muffin
- **H** telling when a popover is "done"

19 In which order are the steps in making popovers given?
- **A** Testing; baking; beating
- **B** Beating; testing; baking
- **C** Testing; beating; baking
- **D** Beating; baking; testing

20 Apparently the author would NOT approve of
- **E** baking popovers at a constant temperature
- **F** using eggs directly out of the refrigerator
- **G** using an electric beater
- **H** using any pans except metal ones

Aug. 10, 1

Dear Marie:

(1) Nothing could have given me greater pleasure t to get news of you. The prospect of remaining months without hearing about you had been extren disagreeable to me: that is to say, your little note more than welcome.

(2) We have promised each other—haven't we?—to b least great friends. If you will only not change y mind! For there are no promises that are bindi such things cannot be ordered at will. It would b fine thing, just the same, in which I hardly dare lieve, to pass our lives near each other, hypnotizec our dreams: your patriotic dream, our humanitar dream, and our scientific dream.

(3) Of all those dreams the last is, I believe, the only l timate one. I mean by that that we are powerles change the social order and, even if we were not, should not know what to do; in taking action, no n ter in what direction, we should never be sure of doing more harm than good, by retarding some evitable evolution. From the scientific point of vi on the contrary, we may hope to do something; ground is more solid here, and any discovery that may make, however small, will remain acqui knowledge.

(4) I thought of asking your permission to meet you chance in Fribourg. But you are staying there, un I am mistaken, only one day, and on that day will of course belong to our friends.

Believe me your very devoted

Pierre Curie

21 The author's immediate purpose is to
- **A** make an appointment with Marie
- **B** explain a misunderstanding
- **C** answer a note Marie has written
- **D** persuade Marie to become a scientist

22 The writer believes that he has the best cha to make a lasting contribution to society as
- **E** a humanitarian
- **F** a patriot
- **G** a scientist
- **H** none of these

23 The style in which this letter is written may b be described as
- **A** bright and chatty
- **B** warm and thoughtful
- **C** scientific
- **D** formal and perfunctory

Go on to the next pag

4 The last sentence in paragraph 2
- **E** summarizes paragraph 2
- **F** links paragraph 2 to 3
- **G** explains the main thought of paragraph 2
- **H** provides an introduction to paragraph 4

5 The writer seems to see no connection between the acquisition of knowledge and
- **A** its power to alter world conditions
- **B** the assurance it gives the learner
- **C** scientific discovery
- **D** the desire of the scientist to experiment

According to a story, Nimrod was an Alaskan oodsman who lost his teeth, killed a bear, took the ear's teeth and fashioned a crude false plate for him-lf, and then ate the bear with its own teeth. So, at agle, I went to sit at the feet of the great Nimrod ad hear the epic yarn in his own words.

I found the story true in its larger elements, but purveyors had neglected a number of small facts. hey neglected, for instance, to state that Nimrod was ot an uncouth creature of the wilds, but a cultured entleman from Maine who still spoke with a Boston rawing-room accent after thirty-nine years in north-n isolation. And they didn't mention the fact that imrod was an experienced artisan, who could do ny sort of minute mechanical work with his hands. aking a set of false teeth was no great task for him.

In 1905 Nimrod was living way up the creek out Eagle. That winter the wolves got in and destroyed l the cache of meat, leaving them with nothing but getables and canned foods. Nimrod got scurvy. ithin a few months there wasn't a tooth in his head, he decided to make himself some teeth.

For the four front ones he used mountain-sheep eth. He said they were almost like human teeth, cept longer, so he just filed them down. Back of ese, four on each side, he used caribou teeth. And r the grinding molars, bear's teeth.

He made his plate of aluminum, drilled out holes r the teeth, set them in, and then worked the warm uminum back over to hold them tight. It took him month. He made both uppers and lowers. And he ore them for nearly twenty-five years. He told me ate a lot of bear meat with them, but not the bear e teeth came from. Eventually a Seattle dentist of-red to make him a set of real teeth in exchange for ose home-made ones. Nimrod sent in his specifica-ons, and back came the store teeth. He was still earing them, after seven years, and the "teeth of the ld" were on display in a Seattle dentist's office.

26 The word "purveyors," in the first sentence of paragraph 2, refers to those who
- **E** never heard the story of Nimrod
- **F** didn't believe the story of Nimrod
- **G** neglected the larger elements of the story of Nimrod
- **H** told the story of Nimrod to others

27 The author says that the storytellers failed to state that Nimrod
- **A** was a hunter
- **B** was a cultured gentleman
- **C** made his own false plate
- **D** lived in Alaska

28 We may gather from this story that
- **E** a bear has the same number of teeth a man has
- **F** the winter of 1905 was unusually cold
- **G** cold climates affect peoples' occupations
- **H** legends are sometimes based on facts

29 Why doesn't the author specifically state whether or not he believes the story Nimrod told?
- **A** He wants to keep the reader in suspense.
- **B** He can't make up his mind.
- **C** It wouldn't be fair to the real Nimrod from Maine.
- **D** It doesn't make any difference.

30 The fact that Nimrod didn't eat the bear with its own teeth
- **E** sets the reader straight
- **F** forms the high point of the tale
- **G** makes the climax believable
- **H** provides the fun of the story

Go on to the next page.

The scene is in the living room in the home of Canon Skerritt, in a small town in Ireland. Brigid, the servant, has just ushered in the schoolmaster, O'Flingsley.

Brigid: Sure just rest a wee while, Master, seein' he's not here yet.

O'Flingsley: Thanks, Brigid. It's not often I get this far into the great one's privacy. Such privileges are not for schoolmasters.

Brigid: Ach, sure it's just his way. Are ye goin' to quarrel with him again?

O'Flingsley: No, Brigid, definitely no. But I will, all the same.

Brigid: Yous hate one another. Sure I know, be now . . .

O'Flingsley: I suppose we do.

Brigid: Isn't it funny now that I think there's no one like aythur of yous. Would that not mean that the two of yous are maybe the one? Or am I blatherin'?

O'Flingsley: You certainly are blatherin', Brigid. If you love *him*, you hate *me*, and if you love *me*, you hate *him*.

Brigid: That's maybe the way it would show on paper, but in the mind it's not maybe as true. (*Pause*) St. Brigid wouldn't deceive me like that.

O'Flingsley (*regarding her half seriously, half humorously*): Are you still on that nonsense, Brigid?

Brigid (*hurt*): Don't say it's nonsense, Master.

O'Flingsley: Have you told anyone about this—the Canon or the curates?

Brigid (*secretively*): No one only you.

O'Flingsley (*touched*): I am not worth all this trust, Brigid. Suppose, some night when I'd have a spree, I'd tell it in a snug.

Brigid (*catching at his arm, tensely*): You—wouldn't do that . . . (*He smiles at her*) Sure, don't I know . . . You have the fine thing in you—the same thing that the Canon has.

31 O'Flingsley is a
A tavernkeeper
B servant
C minister
D teacher

32 Which of the following is the best statement co cerning the type of language used by the cha acters in this scene?
E Brigid and O'Flingsley use language in t same way.
F Brigid uses more formal language th O'Flingsley.
G Brigid speaks more informally than O'Flin sley.
H O'Flingsley's speech is that of the uneducatec

33 The reader's chief reward from this passage is
A a glimpse into character
B the excitement of action
C a vivid picture
D an idea to ponder

34 Which of the following adjectives best describ Brigid?
E Perceptive
F High-strung
G Insensitive
H Critical

35 Brigid's speech, "St. Brigid wouldn't deceive r like that," is effective chiefly because it
A amuses O'Flingsley
B stirs the reader's emotion
C indicates Brigid's trust in O'Flingsley
D shows Brigid's religious nature

If you finish before time is called, y may check your work on either Part O or Part Two.

Form 2 B

Catalog No. 502-02-01

APPENDIX D

Cooperative

Sequential Tests of Educational Progress

Mathematics

©Copyright 1956, 1957 · All rights reserved

Cooperative Test Division · Educational Testing Service · Princeton, N. J. · Los Angeles 27, Calif.

General Directions

This is a test of some of the understandings, skills, and abilities you have been developing ever since you first entered school. You should take the test in the same way that you would work on any new and interesting assignment. Here are a few suggestions which will help you to earn your best score:

1. Make sure you understand the test directions before you begin working. You may ask questions about any part of the directions you do not understand.
2. You will make your best score by answering *every* question because your score is the number of correct answers you mark. Therefore, you should work carefully but not spend too much time on any one question. If a question seems to be too difficult, make the most careful guess you can, rather than waste time puzzling over it.
3. If you finish before time is called, go back and spend more time on those questions about which you were most doubtful.

DIRECTIONS FOR PART ONE

Each of the questions or incomplete statements in this test is followed by four suggested answers. You are to decide which one of these answers you should choose.

You must mark all of your answers on the separate answer sheet you have been given; this test booklet should not be marked in any way. You must mark your answer sheet by blackening the space having the same letter as the answer you have chosen. For example:

0 Which one of the following is an animal?
A Bed
B Dog
C Chair
D Box

Since a dog is an animal, you should choose the answer lettered **B**. On your answer sheet, you would first find the row of spaces numbered the same as the question—in the example above, it is **0**. Then you would blacken the space in this row which has the same letter as the answer you have chosen. See how the example has been marked on your answer sheet.

Make your answer marks heavy and black. Mark only one answer for each question. If you change your mind about an answer, be sure to erase the first mark completely.

Do not turn this page until you are told to do so.

PART ONE

The Great Pyramid is one of a group of three pyramids near Cairo, Egypt. It has been estimated that its original height was 482 feet; due to weathering the height is now 450 feet. The date of construction has been estimated as 2900 B.C.

1 Assuming that the estimated date of construction is correct, in what year would the Great Pyramid be about 5000 years old?

A 500 A.D. **B** 2100 A.D.
C 2400 B.C. **D** 3400 B.C.

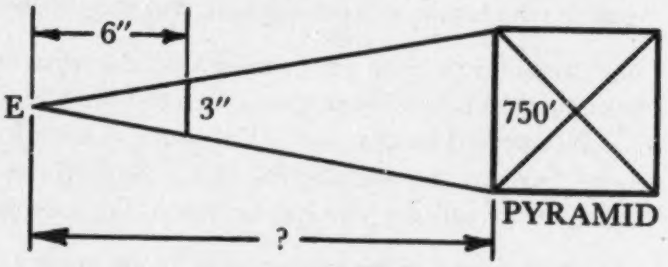
2 What per cent of the estimated original height of the Great Pyramid has been lost because of the weathering?

E 6.6 **F** 7.1 **G** 15.1 **H** 32.0

3 The Empire State Building has 102 stories rising about 1250 feet to the base of a television tower. If the 450-foot Great Pyramid were next to the Empire State Building, how many stories high would it be? (Assume each story to be of uniform height.)

A 15th **B** 28th **C** 37th **D** 41st

4 In the figure below, an observer standing at E holds a ruler 6 inches from one eye and finds that 3 inches of the ruler appears to just cover a base edge, 750 feet long, of the pyramid.



How many feet away from the pyramid is the observer?

E 375 **F** 1500 **G** 2250 **H** 4500

John spent most of his spare time taking care of his garden and orchard.

5 Last year John kept track of the number of tomatoes each plant produced. The average was 24 tomatoes per plant. This year he plans to plant only half as many plants as he did last year. What would be the expected average yield in tomatoes per plant, assuming all growing conditions remained the same?

A 12 **B** 24 **C** 36 **D** 48

6 A solution of 8 level tablespoons of soap flakes to 1 gallon of water is recommended as a spray to kill aphids on rose bushes. To kill aphids on cabbage plants you must use a solution of $\frac{1}{2}$ strength. How many level tablespoons of soap flakes should John put in $\frac{1}{2}$ gallon of water to spray his cabbage, if he follows these recommended directions?

E 1 **F** 2 **G** 4 **H** 8

7 John had enough cabbage plants for two long rows. However, a neighbor gave him enough plants to double the number of rows and triple their lengths. The new number of plants is how many times the original number?

A 3 **B** 5 **C** 6 **D** 12

8 John's garden and trees occupied 1250 square feet. He estimated that at current prices his garden will cost him between $0.50 and $0.70 per square foot for planting and maintenance. According to this estimate, what is the greatest total cost he can expect?

E $625 **F** $750 **G** $875 **H** $1500

9 John's neighbor had an orchard with 40 rows of trees. Each row after the first one had more trees than the preceding row; the increase was the same from row to row. If the first row had 24 trees and the last row had 180 trees, what is the total number of trees?

A 3120 **B** 4080 **C** 4160 **D** 8160

Go on to the next page.

A large grain elevator suddenly collapsed, probably because of spontaneous combustion within the structure. The elevator consisted of 20 cylinders, each 120 feet high, and was filled to capacity with 600,000 bushels of grain at the time of the accident.

10 If each of the 20 cylinders had been one-half as high, how many cylinders would have been required to contain the 600,000 bushels of grain?

E 10 **F** 20 **G** 40 **H** 80

11 The owners hope to save two-thirds of the grain. How many bushels of grain will they probably lose?

A 100,000 **B** 200,000
C 300,000 **D** 400,000

12 If each cylinder held the same amount of grain, what per cent of the total amount of grain did each cylinder contain?

E 5% **F** 20%
G $33\frac{1}{3}$% **H** $66\frac{2}{3}$%

13 The estimated loss in the disaster was $10,500,000. The grain elevator was insured for 75% of the estimated loss. What amount should the owners expect to receive from their insurance?

A $787,500 **B** $1,400,000
C $7,875,000 **D** None of these

14 If the owners decided to rebuild the grain elevator with the same capacity, but in the form of a cube, which of the following computations would they carry out to determine the length, in feet, of a side of the cube? (1 bushel occupies 1.24 cubic feet of space.)

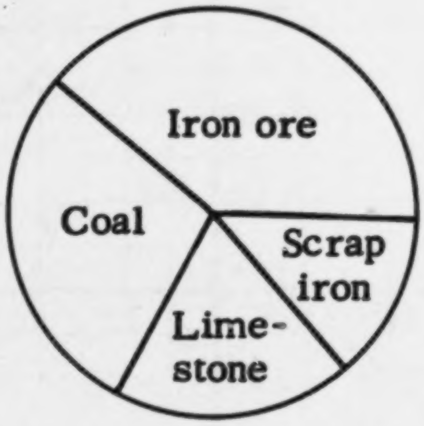
E $\sqrt[3]{\frac{600,000}{1.24}}$
F $\sqrt[3]{600,000}$
G $\sqrt[3]{600,000 \times 1.24}$
H $1.24\sqrt[3]{600,000}$

The steel industry is one of the most important basic industries in the United States.

15 In 1810, only about 1000 tons of steel were made in this country. Forty years later the output was about 6000 tons annually. The output in 1850 was what per cent of the output in 1810?

A 5% **B** 6%
C 500% **D** 600%

16 The circle graph given below represents the relative amounts of raw materials used by the steel industry in 1951.



Which of the following is a correct listing, in order of size from largest to smallest, of the amounts of materials represented on the graph?

E Iron ore, coal, limestone, scrap iron
F Limestone, coal, scrap iron, iron ore
G Coal, limestone, iron ore, scrap iron
H Iron ore, limestone, coal, scrap iron

17 About $1\frac{3}{4}$ tons of iron ore are needed to make 1 ton of pure iron. About how many tons of pure iron can be made from 70 tons of ore?

A 40 **B** 70 **C** 90 **D** 120

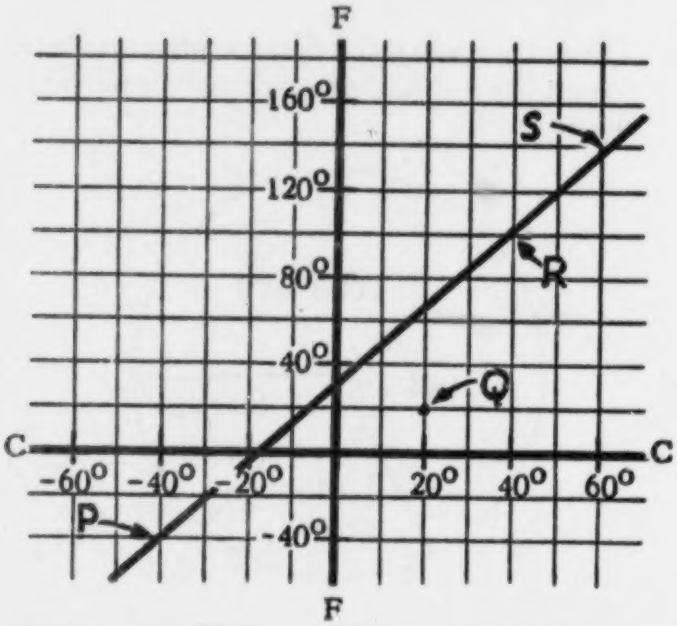
18 In 1953, steel production was about 110 million tons. If the population of the United States in 1953 was 160 million, what was the per capita production of steel for that year in *pounds?*
(A ton is 2000 pounds.)

E 69 **F** 575 **G** 1238 **H** 1375

Go on to the next page.

A science class is studying temperature scales. In addition to the Fahrenheit and centigrade scales, they are learning to work with the Réaumur scale and the Kelvin scale.

19 The graph below shows the relation between Fahrenheit and centigrade scales.



If there is a 40° increase in the temperature as measured on a Fahrenheit thermometer, a centigrade thermometer would indicate a change of about

A $4\frac{1}{2}$° **B** 22° **C** 40° **D** −40°

20 In the above graph showing the relationship between Fahrenheit and centigrade scales, at which point do both thermometers have the same reading?

E P **F** Q **G** R **H** S

21 The formula relating Kelvin and centigrade scales is

$$K = C + 273.18$$

A mixture of alcohol and water that contains 39% of alcohol freezes at 244.5° K. What reading does this represent on the centigrade scale?

A −67.7° C **B** −28.7° C
C 10.3° C **D** 517.7° C

22 The table below shows the relationship betweer the Réaumur and Fahrenheit scales:

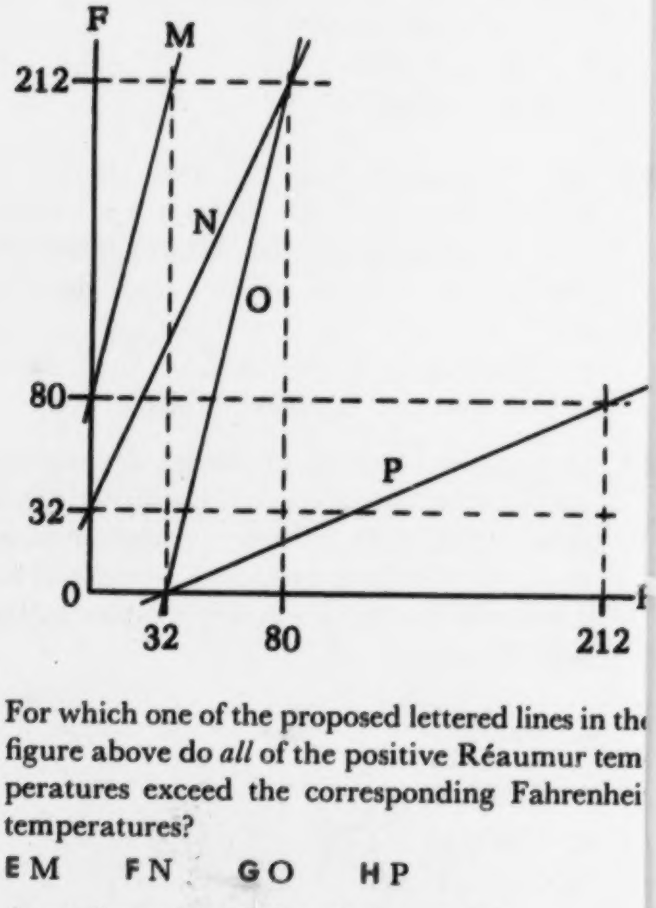
	R	F
Freezing point of water	0°	32°
Boiling point of water	80°	212°

A graph showing this relationship is a straigh line. Approximately what Réaumur reading corresponds to a reading of 50° F?

E 8° **F** 22° **G** 72° **H** 113°

23 Using the table given above, which of the line on the graph below represents the relationshi between Fahrenheit and Réaumur temperatures

A M **B** N **C** O **D** P



24 For which one of the proposed lettered lines in th figure above do *all* of the positive Réaumur temperatures exceed the corresponding Fahrenhei temperatures?

E M **F** N **G** O **H** P

25 According to the Fahrenheit and Réaumur temperature table, when F = 212°, R = 80°. Th equation relating these two scales is

$$F = k R + 32$$

What is the value of k?

A $\frac{12}{53}$ **B** $\frac{4}{9}$ **C** $\frac{9}{4}$ **D** $\frac{61}{20}$

STOP

***Stop.* If you finish before time is called, check your work on this part. Do *not* go on to Part Two until you are told to do so.**

DIRECTIONS FOR PART TWO

Part Two contains the same kind of material as Part One. Mark your answers in the same way.

Do not turn this page until you are told to do so.

PART TWO

Heavy spring rains had caused widespread flood damage in a certain river valley.

1 Flood damage was estimated at \$4,200,000. If this loss was \$1,000,000 less than the most damaging flood ever recorded for that area, what was the loss due to the most damaging flood?

A \$2,200,000 **B** \$3,200,000
C \$4,200,000 **D** \$5,200,000

2 When a dam broke, 10 million gallons of water were suddenly released. If one gallon weighs 8.3 pounds, how many pounds were released?

E 8.3×10^5 **F** 8.3×10^6
G 8.3×10^7 **H** 8.3×10^8

3 The number of inches of rainfall per hour is nearly the same numerically as the number of cubic feet of rainfall per second per acre. Twelve inches of rain in 24 hours is most nearly the same as what number of cubic feet per second per acre?

A $\frac{1}{5}$ **B** $\frac{1}{2}$ **C** 2 **D** 5

4 At one location along the river, the water was 15.6 *feet* deep at 4 p.m. and still rising. The record high level in a previous flood was 16.1 *feet.* If the level continues to rise at the rate of 1 *inch* per hour, the water level would reach the previous record in how many hours?

E 5 **F** 6 **G** 15 **H** 18

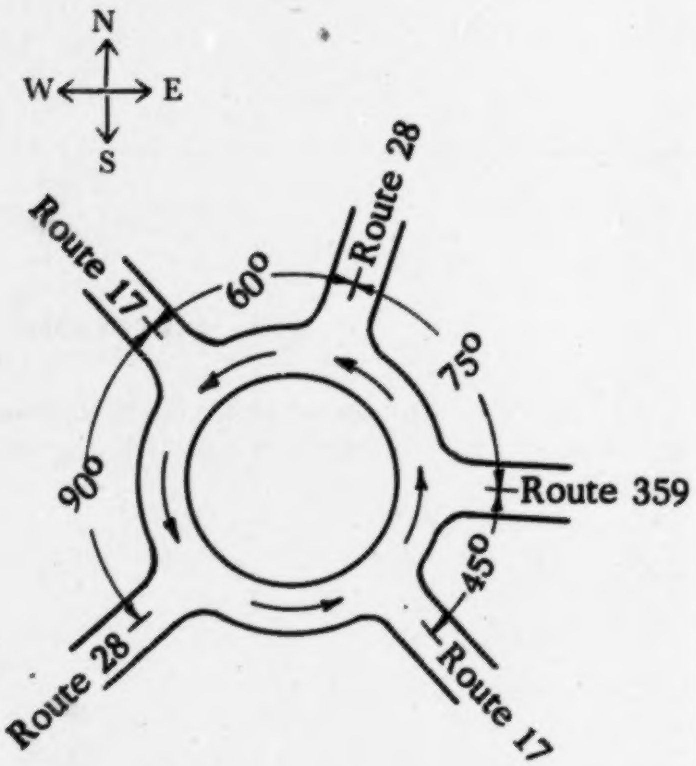
A state highway commission is planning a program of highway improvement.

5 A new state highway is planned along the diagonal of a rectangular county which is 40 miles long and 30 miles wide. How many miles long will the new highway be?

A $10\sqrt{7}$ **B** 50 **C** 70 **D** 500

6 On the traffic circle below, one can move only in a counterclockwise direction. If a driver enters the circle on Route 359 and wants to go southwest on Route 28, around what fractional part of the circle must he travel?

E $\frac{5}{24}$ **F** $\frac{3}{8}$ **G** $\frac{5}{8}$ **H** $\frac{3}{4}$



7 In order to attract Mexican tourists, the commission sent road maps with metric distances to Mexican travel agencies. On these maps, the number of kilometers between City P and City Q was twice the number of kilometers between City R and City S. If these distances are expressed in miles, what is the ratio of the number of miles in distance PQ to the number of miles in distance RS? (1 kilometer is the same distance as 0.621 miles.)

A 1 to 2 **B** 621 to 1000
C 1 to .621 **D** 2 to 1

The Todd family has decided to sell their house through a real-estate agent.

8 If the real-estate agent were to sell the house for \$13,000 at a 5% rate of commission, how much would the Todds receive, assuming that this commission was the only expense of the sale?

E \$6,500 **F** \$10,400
G \$12,350 **H** \$13,650

9 If it cost them \$12,500 to build the house 5 years ago and if the value of the house has depreciated 2% of its original cost each year, what is the present value of the house?

A \$11,250 **B** \$12,250
C \$12,375 **D** \$13,750

10 When Mr. Todd inquired about a final electricity bill for the house, he was told that the bill was based on the number of kilowatt-hours used. (1 kilowatt = 1000 watts.) The rate schedule is as follows:

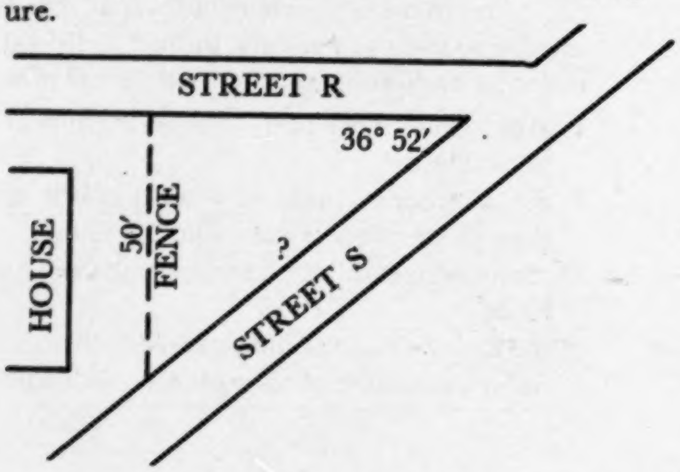
First 30 kilowatt-hours at 4 cents per kilowatt-hour

Next 40 kilowatt-hours at 3 cents per kilowatt-hour

His final meter reading showed that he had used 65 kilowatt-hours since his last bill was figured. Which of the following is a correct way to compute the amount of the bill?

E 65 × .03
F 65 × (.03 + .04)
G (30 × .04) + (65 × .04)
H (30 × .04) + (35 × .03)

1 One corner of the Todd property is at the intersection of street R with street S as shown in the figure.



Before selling, Mr. Todd decided to build a fence perpendicular to street R. If he uses 50 feet of fencing, how many feet from the intersection will the fence start on street S?

sin 36° 52′ = 0.60
cos 36° 52′ = 0.80
tan 36° 52′ = 0.75

A 30.0 **B** 37.5 **C** 40.0 **D** 83.3

The table below gives the total number of immigrants to the United States in each year of a ten-year period. The figures at the right indicate the changes between successive years.

TOTAL IMMIGRATION
TO THE UNITED STATES
1901–1910

Year	Number of Immigrants	Change from Previous Year
1901	487,918	
1902	648,743	+160,825
1903	857,046	+208,303
1904	812,870	+44,176
1905	1,026,499	+213,629
1906	1,100,735	+74,236
1907	1,285,349	+184,614
1908	782,870	−502,479
1909	751,786	−31,084
1910	1,041,570	+289,784

12 Expressed to the nearest thousand, the number of immigrants during 1905 was

E 1,026,000 **F** 1,026,500
G 1,027,000 **H** 1,030,000

13 Between what two years was the change in the number of immigrants the LEAST?

A 1903 and 1904 **B** 1907 and 1908
C 1908 and 1909 **D** 1909 and 1910

14 If the change from the previous year for 1901 was +39,346, how many immigrants entered the United States in 1900?

E 446,572 **F** 448,572
G 522,264 **H** 648,743

15 By which of the following methods can you find how many more immigrants entered in 1910 than in 1901?

I. By subtracting the total for 1901 from the total for 1910
II. By adding all the changes given in the right-hand column of the table

A Only I **B** Only II
C Neither I nor II **D** Either I or II

Go on to the next page.

The senior class had a picnic for its members and guests.

16 Assuming that a salad for 10 persons requires $\frac{1}{4}$ pint of salad dressing, how many pints of salad dressing should be ordered to make salad for a group of 100?

E 2 **F** $2\frac{1}{2}$ **G** 5 **H** 10

17 The planning committee ordered 8 cases of soft drinks containing 24 bottles each. When the picnic was over, 58 bottles were unopened. How many empty bottles should be accounted for? (Assume all opened bottles to be empty.)

A 8 cases of empties
B 6 cases of empties plus 14 empties
C 5 cases of empties plus 14 empties
D 2 cases of empties plus 10 empties

18 At the picnic one of the boys paced off a softball diamond, making the base lines 24 paces long. If adjoining base lines were perpendicular, he should have found that the distance from home to second base through the pitcher's mound was about how many paces?

E 24 **F** 34 **G** 41 **H** 48

19 Altogether, 152 picnic tickets were sold at $0.75 each for class members and $1.00 each for guests. The total receipts were $122.00. Although no record was kept of the number of each type of ticket that had been sold, the committee could determine the number of each by solving which of the following sets of equations?

A $x + y = 152$
$1.00x + .75y = 122.00$

B $x = 152 + y$
$x + .75y = 122$

C $y = 152 - x$
$x + 75y = 12{,}200$

D $x + y = 152$
$100x + 75y = 122$

Mr. Eldridge owns a large shoe store for men. Afte many years of experience, he has found that he sell an average of 8000 pairs of shoes each year. He ha constructed the following table to show the sales distribution of the various sizes.

Size	Average Number Sold Per Year	Per Cent of Total
6	290	3.6
$6\frac{1}{2}$	320	4.0
7	330	4.1
$7\frac{1}{2}$	670	8.4
8	700	8.8
$8\frac{1}{2}$	970	12.1
9	1000	12.5
$9\frac{1}{2}$	980	12.3
10	660	8.3
$10\frac{1}{2}$	650	8.1
11	340	4.2
$11\frac{1}{2}$	320	4.0
12	310	3.9
$12\frac{1}{2}$	290	3.6
13	170	2.1
	8000	100.0

20 Mr. Eldridge is writing an order for new shoe On the basis of his past experience, about wha per cent of the order should be for the most popular size?

E 8% **F** $12\frac{1}{2}$% **G** 25% **H** 80%

21 At any given time Mr. Eldridge can expect tha slightly less than 12% of the shoes in stock are under which size?

A 7 **B** $7\frac{1}{2}$ **C** 8 **D** $8\frac{1}{2}$

22 Mr. Eldridge is planning to open an athletic supply house in his city. He decides that it might b unwise to use the per cent figures in his table i ordering basketball and football shoes because

E athletes use more pairs of shoes each year tha nonathletes
F the number of male athletes is much small than the number of men who buy shoes
G many people do not wear special shoes for athletics
H the distributions of shoe sizes for athletes migh differ from those of his customers as a whole.

A science class was studying a unit on weather.

23 One year in a dry area, there was no precipitation from January 1 to the end of August, while the rest of the year showed daily traces of precipitation. During approximately what per cent of the year was there some precipitation?

A 20 B 33 C 66 D 80

24 The ratio of the depth of snow to the depth of the water produced when it melts is 10 to 1. A volume of water which is one square foot by one inch weighs 5.03 pounds. A 3.1-inch snowfall on a flat roof area 30 feet by 40 feet would be equivalent to how many pounds of water?

E 156 F 1,870
G 18,700 H 19,500

25 Which of the following formulas should you use to determine the weight **W,** in pounds, of a spherical hailstone **d** inches in *diameter* if **K** is the number of pounds per cubic inch of ice? (The volume of a sphere is $\frac{4}{3}\pi r^3$.)

A $W = \frac{K\pi d^3}{24}$ B $W = \frac{4K\pi d^3}{3}$

C $W = \frac{K\pi d^3}{6}$ D $W = \frac{\pi d^3}{6K}$

If you finish before time is called, you may check your work on either Part One or Part Two.

APPENDIX E

THE UNIVERSITY OF WISCONSIN
Department of Education

Pupil Questionnaire

Name________________________________ Father's Occupation__________

1. Put a circle around the grades in which you attended a one-room school; for example, if you attended a one-room school the first four grades, your answer would look like this: 1 2 3 4 5 6 7 8.

   0 1 2 3 4 5 6 7 8

2. Circle the number of the grades you attended school when there were only one or two grades in each room:

   0 1 2 3 4 5 6 7 8

3. Did you ever repeat a grade? Circle one: Yes No

4. How many years have you been a 4-H club member? Circle one:

   0 1 2 3 4 5 6 7

APPENDIX F

THE UNIVERSITY OF WISCONSIN
MADISON 6

The School of Education
Department of Education

Education Building

April 16, 1959

Dear Administrator, Guidance Director or Teacher:

We have been informed that you are going to assist in a University of Wisconsin research project by giving some tests to all of your freshman class. We strongly urge that they be tested the morning of May 5. If over 10% of the class is absent, you may postpone the test a few days. Please accept our hearty thank you for your cooperation in this project.

Within a few days these test materials and instructions will be mailed to you. If these are not in your possession by April 24 or if you have any questions concerning the tests, please call person to person collect:

Desmond Bragg
Alpine 5-3311
Extension 2327
Madison, Wisconsin

The students will be taking two tests each of seventy minutes length. Half will take the reading test while the others are taking the mathematics test, so you will receive only half as many of each test as there are students in your freshman class. The instructions are the same for both tests. The tests should be distributed so that every other student or every other row is taking a different test. If students are at tables, it should be every other student. If students are in rows of individual seats, it should be every other row.

The test booklets should not be marked since the tests will be exchanged at the end of the first seventy minutes.

It is very important that uniformity be maintained in the administration of the tests; therefore, we urge a close adherence to the instructions as shown in the published manual and in the mimeographed instructions.

Cordially yours,

Burton W. Kreitlow
Professor of Education

BWK:AH

APPENDIX G

Summary Data On Achievement and Henmon-Nelson Scores for Farm Students from Large, Medium and Small Schools

N = 100 X = Achievement Y = Henmon-Nelson

Large Schools Achievement

ΣX^2 = 356,589
ΣXY = 257,854
$\bar{X}$ = 57.59
T = 5,759
N = 100
σ = 15.868

(r = .73)

Large Schools Henmon-Nelson

ΣY^2 = 194,778
ΣXY = 257,854
$\bar{Y}$ = 42.20
T = 4,220
N = 100
σ = 12.9856

Medium Sized Schools

ΣX^2 = 427,465
ΣXY = 309,363
$\bar{X}$ = 63.09
T = 6,309
N = 100
σ = 17.2418

(r = .873)

ΣY^2 = 228,460
ΣXY = 309,363
$\bar{Y}$ = 45.74
T = 4,574
N = 100
σ = 13.9426

Small Sized Schools

ΣX^2 = 397,112
ΣXY = 284,281
$\bar{X}$ = 60.96
T = 6,096
N = 100
σ = 16.0492

(r = .7475)

ΣY^2 = 210,310
ΣXY = 284,281
$\bar{Y}$ = 44.36
T = 4,436
N = 100
σ = 11.6900

APPENDIX H

Analysis of Co-Variance for Achievement and Intelligence Among Large, Medium and Small Schools

Large Schools

N=100

	I	A	ΣI^2	ΣA^2	ΣIA	
T	4220	5759	194,778	356,589	257,854	r = .73
M	42.20	57.59	178,084	331,661	243.030	
			16,694	24,928	14,824	

Medium Schools

	I	A	ΣI^2	ΣA^2	ΣIA	
T	4574	6309	228,460	427,465	309,363	
M	45.74	63.09	209,215	398,035	288,574	r = .87
			19,245	29,430	20,789	

Small Schools

	I	A	ΣI^2	ΣA^2	ΣIA	
T	4436	6096	210,310	397,112	284,281	r = .74
M	44.36	60.96	196,781	371,612	270,418	
	13230	18164	13,529	25,500	13,863	
	44.10	60.54				
			633,548	1,181,166	851,498	
			583,443	1,099,649	801,032	
			50,105	81,517	50,466	

I = Henmon-Nelson A = Achievement

APPENDIX H (Cont.)

Summary of Variance

Source	ΣI^2	ΣA^2	ΣIA	DF
Large Schools	16,694	24.928	14,824	99
Medium Schools	19,245	29,430	20,789	99
Small Schools	13,529	25,500	13,863	99
Within	49,468	79,858	49,476	297
Among	616	1,659	990	2
Total	50,084	81,517	50,466	299

Partitioning of Variances (y)

Source	Residuals	Regression	Total
Between R	224.00		
Among m	68.00		
Among S	292.00	2	
Within S	30,374.00	296	
Total	30,666.00	298	

Analysis of Residuals

Source	Residuals	Df	Mean Sq.	F
Among Mean				
Between Regression				
Among Schools	292	2	146	
Within Schools	30,374	296	103	1.417
Totals	30,666	298		

APPENDIX H (Cont.)

Variance Among Means

	M_I	M_A	I^2	A^2	IA
Large	42.20	57.59	1780.84	3316.61	2430.30
Medium	45.74	63.09	2091.94	3980.35	2885.74
Small	44.36	60.96	1,967.81	3716.12	2704.18
T	132.30	181.64	5840.59	11,013.08	8020.22
M	44.10	60.54	5834.43	10,996.49	8010.32
		Times M(100) =	6.16	16.59	9.90
		=	616	1659	990

APPENDIX I

Mean Achievement and Henmon-Nelson Scores for Farm Students from High, Medium and Low Cost Reorganized School Districts of Wisconsin

High Cost Schools
N=100

Achievement

$Tx = 5837$
$\Sigma X^2 = 363,443$
$M = 58.370$
$\Sigma xy = 256,581$

Henmon-Nelson

$Ty = 4154$
$\Sigma y^2 = 186,132$
$M = 41.540$

$r = .803$

Medium Cost Schools
N=135

Achievement

$Tx = 8298$
$\Sigma X^2 = 551,196$
$M = 61.466$
$\Sigma xy = 397,359$

Henmon-Nelson

$Ty = 6034$
$\Sigma y^2 = 296,812$
$M = 44.696$

$r = .792$

Low Cost Schools
N=169

Achievement

$Tx = 10,087$
$\Sigma X^2 = 635,623$
$M = 59.686$
$\Sigma xy = 458,669$

Henmon-Nelson

$Ty = 7284$
$\Sigma y^2 = 337,696$
$M = 43.100$

$r = .846$

Appendix I (Cont.)

Analysis of Co-Variance Between Achievement and Intelligence in High, Medium and Low Cost Schools = N = 300

High Cost Schools = N=100

I	A	I^2	A^2	IA	
T=4154	5837	186,132	363,443	256,581	
M=41.54	58.37	172,557	340,705	242,469	r = .803
		13,575	22,738	14,112	

Medium Cost Schools = N=100

I	A	I^2	A^2	IA	
T=4517	6148	223,507	407,380	294,575	
M=45.17	61.48	204,132	377,979	277,705	r = .705
		19,475	29,401	16,870	

Low Cost Schools = N=100

I	A	I^2	A^2	IA	
T=4316	5991	200,278	380,797	273,296	
M=43.16	59.91	186,278	358,921	258,571	r = .856
		14,000	21,876	14,725	
12,987	17,976	609,917	1,151,620	824,452	
43.29	59.92	562,207	1,077,122	778,181	
		47,710	74,498	46,271	

r = .776

APPENDIX I (Cont.)

Variance Among Means

	M_I^x	M^y	X^2	Y^2	XY
High Cost	41.54	58.37	1725.57	3407.05	2424.69
Medium Cost	45.17	61.48	2040.32	3779.79	2777.05
Low Cost	43.16	59.91	1862.78	3589.20	2585.71
T =	129.87	179.76	5628.67	1,0776.04	7787.45
M =	43.29	59.92	5622.07	1,0771.21	7781.81
		Times m(100)	6.60	4.83	5.64
		=	660	483	564

Summary of Variances

Total

$\Sigma x^2 = 47,710$

$\Sigma y^2 = 74,498$

$\Sigma xy = 46,271$

Among Means

$\Sigma x^2 = 6.60 \times 100 = 660$

$\Sigma y^2 = 4.83 \times 100 = 483$

$\Sigma xy = 5.64 \times 100 = 564$

Within Schools

High Cost= $\Sigma x^2 = 13,575$
$\Sigma y^2 = 22,737$
$\Sigma xy = 14,112$

Medium Cost= $\Sigma x^2 = 19,475$
$\Sigma y^2 = 29,401$
$\Sigma xy = 16,870$

Low Cost= $\Sigma x_2^2 = 14,000$
$\Sigma y^2 = 21,876$
$\Sigma xy = 14,725$

Total = $\Sigma x^2 = 46,549$
$\Sigma y^2 = 74,014$
$\Sigma xy = 45,707$

APPENDIX I (Cont.)

Summary of Variances

Source	Σx^2	Σy^2	Σxy	DF
High Cost	13,575	22,738	14,112	99
Medium Cost	19,475	29,401	16,870	99
Low Cost	14,000	21,876	14,725	99
Within	47,050	74,015	45,707	297
Among	660	483	564	2
Total	47,710	74,498	46,271	299

Partitioning of Variances (y)

Source	Residuals	Regression	Total
Between R -	8.96		
Among Means	1.04		
Among Schools	10.00		
Within Schools	29,613		
Total	29,623		

Analysis of Residuals

Source	Residuals	D.F.	Mean Square	F
Among Mean	1.04	1		
Between Regressions	8.96	1		
Among Schools	10.00	2	5.00	
Within Schools	29,613	296	100.04	.049 N.S.
Total	29,623	298		

A STUDY OF THE SIZE-COST-ACHIEVEMENT RELATIONSHIPS
IN THE REORGANIZED DISTRICTS OF WISCONSIN

DESMOND HALCOMB BRAGG, PH.D.
UNIVERSITY OF WISCONSIN, 1960

ADVISOR: PROF. BURTON W. KREITLOW

Statement of the Problem

The problem of this study was to determine what relationships there were between the net enrollment, the per pupil cost and student achievement in the elementary schools of the reorganized districts of Wisconsin. The Pearson-product moment correlation was used for this purpose. An analysis was also made to measure significant differences in achievement among three size groups, large (over 800); medium (400 to 800); and small (less than 400) total net enrollment for the 1958-59 school year. The problem was also to measure any differences in achievement among high, medium and low cost schools.

Design of the Study

All the districts of Wisconsin which became reorganized during the 1948-51 period were included in the study.

Costs per pupil were based on the five year average costs for current operating expenses at the elementary level.

The size factor was analyzed from both the total net enrollment (high school and elementary) and from the five year average net enrollment at the elementary level.

Achievement scores were based on the reading and mathematics sections of the STEP tests given to all ninth graders.

All ninth graders who had spent their entire school life in the districts under study formed the population of the study.

Intelligence data were based on the Henmon-Nelson test.

Paternal occupations were used to determine the type of home the student came from.

Findings of the Study

There was no correlation between size and achievement and none between cost and achievement. There was a slight, but consistent, negative correlation between cost and size.

There was no difference in achievement among the three size groups or cost groups. The differences in cost per pupil among the large, medium and small groups was $26.00 and the cost differences between the high cost group and the low cost group was roughly $80.00.

The only factor which consistently agreed with achievement was the student's intelligence.

Students attending one-room schools in the reorganized districts performed as well in reading and mathematics as those from the graded or multi-room schools.

Conclusions

The costs per pupil do not vary enough among the various schools to establish valid conclusions based on cost differences.

Achievement does not seem to be related to size of the district or the cost per pupil at the elementary level, in this size reorganized district.

Many of the reorganized districts of Wisconsin seem small for effective operation and it is questionable whether they can offer a strong educational program.